

BINARY CHEMICAL WEAPONS

HEARINGS
BEFORE THE
COMMITTEE ON APPROPRIATIONS
UNITED STATES SENATE
NINETY-SEVENTH CONGRESS
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Nondepartmental Witnesses



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BINARY CHEMICAL WEAPONS

WEDNESDAY, MAY 5, 1982

U.S. SENATE,
COMMITTEE ON APPROPRIATIONS,
Washington, D.C.

The committee met at 2:05 p.m., in room 1114, Everett McKinley Dirksen Senate Office Building, Hon. Mark Hatfield (chairman) presiding.

Present: Senators Hatfield, Garn, and Bumpers; also present: Senator Pryor.

NONDEPARTMENTAL WITNESSES

PANEL No. 1

STATEMENTS OF:

HON. JAMES F. LEONARD, FORMER AMBASSADOR AND SENIOR
OFFICIAL IN THE ARMS CONTROL AND DISARMAMENT AGENCY ON
CHEMICAL AND BIOLOGICAL WARFARE ISSUES

REAR ADM. THOMAS D. DAVIES, U.S. NAVY (RET.)

SAUL HORMATS, RETIRED, FORMER EMPLOYEE AT EDGEWOOD
ARSENAL, MARYLAND, FOR 37 YEARS

OPENING STATEMENT OF CHAIRMAN HATFIELD

Chairman HATFIELD. The committee has convened hearings today to assess the wisdom of proceeding with the production of binary chemical weapons. If the Congress approves the administration's proposal, it will be departing from a moratorium which was established 13 years ago by President Richard Nixon. While the funding level for this year is relatively small by military standards, we will be taking a first step toward a program which will ultimately cost many billions of dollars.

It is because of the significance of this decision that Congress has endorsed, on two occasions during consideration of the appropriations bill, language regarding consultation with our European allies on the binary program. I seriously question the compliance of the administration with this conference report language. It is for this reason, as well as a request from Senator Pryor, that the full committee holds hearings today on the chemical weaponry program.

This hearing could not have gone forward without the consent and full cooperation of the chairman of the Defense Subcommittee, Senator Ted Stevens. He has been sensitive over the years to my deep concern over this issue and has endeavored to be helpful in every way.

The issue of chemical weapons is an emotional one. We have all heard the ugly reports of the use of chemical weapons by Communist governments in Southeast Asia and possibly elsewhere. Unfortunately, time does not permit an intensive examination of this question today. However, I do not believe that any member of this committee believes it wise or prudent to simply assume that we can trust the Soviets not to engage in chemical warfare against U.S. forces and our allies. We all believe this is possible and that steps must be taken to deter such an eventuality. This is why the alleged use of chemical weapons by Soviet surrogates is not particularly relevant to this meeting. We all agree that the threat is real. What we must determine is how to best respond.

Determining the sufficiency of our deterrent capability is a complex issue. It involves the current and future integrity of the U.S. chemical munitions stockpile. It involves the political ramifications with respect to Europe. It involves the potential benefit we may be providing to terrorist groups and governments. And it involves certain opportunity costs.

We are in a period of budget austerity. We must reduce the Federal deficit and return our economy to a healthy state. Thus, producing chemical munitions may mean foregoing other steps aimed at enhancing our national security, including other conventional defense priorities. We cannot afford to close our eyes because of the relatively small size of this year's request and ignore the long-term budget implications of this program, which are immense.

We must also look at the implications for arms control contained in this proposal. This administration has not pursued negotiations with the Soviet Union on chemical weapons. We have witnesses who will speak to this point.

Finally, we must recognize that there is a moral and strategic dimension to this issue. Chemical warfare will entail massive civilian casualties. Let me underscore civilian casualties. We can offer no protection to the innocent. Our allies are justifiably concerned over unilateral military decisions posing grave implications for their security. We cannot be secure unless the NATO alliance as a whole is cohesive and secure. There is certainly a tolerance level beyond which we do more harm than good. If it is truly not necessary to do so, the production of nerve gas could move us beyond this threshold.

I welcome today's witnesses who will testify in two panels. First we will call the Honorable James Leonard to give testimony, followed by Rear Adm. Thomas Davies and Mr. Saul Hormats.

If you gentlemen have prepared statements, we will place them in the record in full, and you may handle your testimony as you may desire, either by highlighting it or in a summarization, whichever is your preference.

Before I invite the witnesses to give their testimony, I would ask if Senator Pryor has any opening comments that he wishes to make at this time.

Senator PRYOR. Mr. Chairman, I would first like to sincerely thank you and the members of the Appropriations Committee for holding this

hearing. I think it is most timely, especially now that the defense authorization bill is at this moment being debated on the Senate floor.

I deeply appreciate, Mr. Chairman, you so graciously inviting me to participate with your committee members. I am very honored to be here today.

OPPOSITION TO BINARY NERVE GAS

Senator PRYOR. If I might just give one or two reasons why I have opposed the production of binary nerve gas.

First, we have an enormous existing stockpile of chemical weapons. Some estimates are that we have enough to kill every man, woman, and child on this Earth several times over. My question is why increase that supply?

Second, why should we at this time not look at the real effect of nerve gas? In other words, who does nerve gas really kill? It does not necessarily kill soldiers who are garbed in protective clothing. Nerve gas kills civilians and it kills unprotected men, women, and children without those masks and protective gear.

Third, let's assume that we do actually increase our supply and go back into the production of nerve gas and chemical warfare. Where are we going to put it? What are we going to do with it? How are we going to deploy it?

I look at this issue very similarly as I looked at the MX issue. I am afraid, Mr. Chairman, unless there is a great deal of change of mind and heart on this Hill, that we are probably on the eve of constructing and manufacturing yet another orphan child in our defense arsenal, just as we have done with the MX.

Finally, Mr. Chairman, I think we need to look at the dollars we are going to spend. Where are our real defense priorities? Is it in this exotic new production of nerve gas or would it be better spent in our conventional defense?

I think, Mr. Chairman, these are the issues and concerns that we will discuss in this hearing and hopefully find the answers to. I am once again very honored you would invite me to participate.

Chairman HATFIELD. You are entirely welcome, Senator Pryor.

BIOGRAPHICAL SKETCH OF WITNESSES

The Honorable James F. Leonard is a former ambassador and senior official in the Arms Control and Disarmament Agency on chemical and biological warfare issues. He was a U.S. negotiator to multilateral disarmament talks on chemical weapons in Geneva during the Nixon administration.

Rear Adm. Thomas D. Davies, retired from the Navy, is a former Commander of U.S. Carrier Divisions of the Atlantic and Mediterranean Fleets and former Chief of Naval Development, Department of Defense, under the Nixon administration. He was Assistant Director for the U.S. Arms Control and Disarmament Agency during the Nixon, Ford, and Carter administrations.

Mr. Saul Hormats, now retired, was employed at the Edgewood Arsenal, Maryland for 37 years. He directed the development of the cur-

rent chemical munitions and protective equipment of the U.S. Army and was closely involved with various aspects of U.S. biological warfare and nuclear activities and with the intelligence community. He is a retired Reserve officer and a fellow, American Association for the Advancement of Science.

I think it is very obvious from the very brief résumés, and they are indeed very brief, we could have extended these remarks on introducing these very distinguished people by pages of credentials and experience and background, publications and articles. But because of the time constraint, I merely highlighted very briefly the extraordinary qualifications that these gentlemen bring to this hearing today.

Ambassador Leonard, I guess you are the lead-off gentleman on this panel. We would be very happy to hear from you at this time. Thank you again for coming.

COMMITTEE FOR NATIONAL SECURITY

STATEMENT OF JAMES F. LEONARD

Mr. LEONARD. Mr. Chairman, I am most grateful to you for the opportunity to testify here today. I am particularly honored by the company in which you placed me here with these other distinguished expert witnesses on this subject.

I have a prepared statement which you noted will be placed in the record.

[The statement follows:]

The Committee for National Security

PREPARED STATEMENT OF JAMES F. LEONARD

The U.S. faces three serious problems in the field of chemical and biological weapons: what to do about the reports that these weapons are being used in Indo-China and Afghanistan, whether to press forward with the production of its own binary chemical weapons, and whether to resume serious efforts at Geneva to negotiate a treaty on the complete elimination of chemical weapons.

The reports that chemical and perhaps even biological (toxin) weapons are being used by the Soviets or their Vietnamese friends are most disturbing. If true, and the evidence is mounting, then this Soviet disregard for its solemn obligations is utterly reprehensible, and the U.S. should be a leader in the international effort to expose the full facts and press for an immediate end to such acts.

The Reagan Administration has rightly followed its predecessor's initiative in pushing for a full and impartial investigation through the UN, which has already taken an incomplete and hurried first look at the charges. Only if world opinion is satisfied that the charges are solidly based and not merely part of an anti-Soviet crusade or a cover for a chemical weapons buildup by the U.S. can effective pressures be brought to bear on the Soviet Union.

The other two problems -- binary weapons and CW negotiations-- are separate from the alleged treaty violations and should be kept separate, despite the understandable tendency to link them.

We should produce more chemical weapons only if production is necessary to deter the Soviets from possibly using CW in a blitzkrieg attack on Western Europe. There is no such necessity and binaries should therefore not be produced. Apart from the very low probability of any such Soviet attack, the military advantage of first using CW would be quite marginal. It would be reduced to zero by even a modest U.S. capability to retaliate in kind. The U.S. has just such a capability--quite adequate stocks of nerve agents and mustard gas--despite the assertions of various Defense Department officials that our stocks are too small, obsolete, deteriorating, etc.

Our stocks may or may not match those held by the Soviets. Since no one--I repeat, no one--really knows, even within wide margins, how much they have, debate on that point is quite useless. It is pointless as well, since we have what we need to discourage them from any dangerous adventure with CW in Europe.

The Soviets are paying a heavy price, politically, for their unwillingness or inability to disprove the allegations of CW posture. We have gained credits, politically, for our suspensions since 1969 of CW production, for our unilateral renunciation of the possession of biological and toxin weapons, and for our sincere, if fitful, pursuit of a verifiable ban on the possession of chemical weapons. Resuming CW production would forfeit these gains, it would give the Soviet Union a propaganda windfall it does not deserve, and it would upset our allies, especially the Germans, who do not want to be asked to receive additional stockpiles on their soil. Indeed, there is no chance that any ally will agree to such a request, and the binaries, if produced, will simply be useless additions to the existing stores in this country.

One can hope that the Congress will have the wisdom, which the Administration has lacked, to reject any production of binary weapons. And one can hope, rather forlornly, that the Administration will make a virtue of this rejection and will use the high ground on which they could then stand to resume serious negotiations in Geneva on a treaty to eliminate chemical weapons completely and permanently.

Even if these negotiations are resumed and make unexpectedly rapid progress, the problems of verification will be serious, and a treaty might not be achieved for some years. The process of destroying existing stocks will necessarily take additional years--more than a decade for the U.S., according to the Defense Department. This is a slow track to chemical disarmament. If travelled carefully--and I am confident there will be many watching to be sure that our negotiators are careful, this track need not be dangerous. In fact, our security will increase as we move along it.

This slow track is not, however, the only one available, if the Administration truly is willing to reduce the danger of chemical warfare in Europe through arms control arrangements. A fast-track proposal would establish a zone free of chemical weapons on both sides of the East-West dividing line in Central Europe. Such a zone would make far less likely the sort of chemical aggression which the Administration fears. There would of course be verification problems, but they would be much more manageable than with proposals involving global elimination of all chemical weapons.

So far as I know, the possibility of such a zone in Central Europe has not been seriously studied by this or any previous administration. I would urge the Congress to explore it with the Administration before approving production of binaries.

I should caution that CW production would not be a bargaining chip, strengthening the hand of our negotiators. Quite the contrary, since the predictable West European reaction to a production decision, already foreshadowed by the decisions of the recent congress of the governing

party in Germany, would weaken our negotiating position. If we continue to mismanage this problem, we will have a de facto chemical-weapon-free zone on our side of the East-West dividing line. That will hardly be a position of strength, even if we have large stocks of brand new binaries somewhere west of Denver.

One final note on this CW problem. Chemical weapons are singularly repellent. The world was horrified when it saw what these weapons did to so many human beings in World War I. But nuclear weapons are far worse. Anything that we can do to make nuclear war less likely is more than desirable, it is a moral imperative. Solutions to our problems with chemical arms control can, in fact, point us in a good direction.

It is past time for the two major nuclear powers to begin to disengage from the nuclear confrontation in Central Europe, where thousands of tactical nuclear weapons are deployed close to the dividing line on both sides. A zone in Central Europe free of chemical weapons could serve as a precursor and perhaps a test case for nuclear disengagement. Such a sequence of arms control agreements would indeed be achievements of historic proportions.

Perhaps President Reagan and his staff, as they contemplate his coming trip to Europe and his appearance at the UN, could give these perspectives some thorough consideration.

SOVIET USE OF CHEMICAL WEAPONS

Mr. LEONARD. The first point which I treat in that prepared statement is this question of alleged Soviet use of chemical weapons. I won't say any more about that, except simply to endorse very strongly the comment you yourself just made, that no one should assume or should take on faith the idea the United States can simply expect the Soviets not to use chemical weapons. The problem is a far more serious one.

There are two other problems which I would like to deal with. One is this question of production of binary weapons, and the second the question of negotiations in order to try to eliminate chemical weapons. These are, of course, as you have noted, separate from the question of possible treaty violations, and they should be kept separate even though it is a very understandable tendency to try to link them.

U.S. PRODUCTION OF CHEMICAL WEAPONS

Mr. Chairman, we should produce more chemical weapons if, but only if, production is necessary in order to deter the Soviets from possibly using chemical weapons in a blitzkrieg attack on Western Europe. There is no such necessity, and binaries should therefore, in my opinion, not be produced. Apart from the very low probability of any such Soviet attack, the military advantage of first using chemical weapons would be quite marginal. That military advantage would be reduced to zero by even a modest U.S. capability to retaliate in kind.

The United States has exactly such a capability. As Senator Pryor just noted, quite adequate stocks of nerve agents and other agents, such as mustard gas, do exist, despite the assertions of various officials that our stocks are obsolete, deteriorating, and so on.

These stocks may or may not match the stocks that are held by the Soviets. No one, and I am absolutely convinced of this, no one knows what the Soviet stocks are, even within very wide margins. And therefore, debating whether we have more or not is simply useless. It is also quite pointless because we have what we need to discourage them from any dangerous adventure with chemical weapons in Europe.

U.S. SUSPENSION OF CHEMICAL WEAPONS PRODUCTION

The Soviets are paying a heavy price politically for their unwillingness or their inability to disprove the allegations of CW use. We, the United States, have gained credit over the years, I think, politically, for our suspension, ever since 1969, of chemical weapons production and of toxin weapons and for our sincere, if somewhat spasmodic, pursuit of a verifiable ban on the possession of chemical weapons. To resume chemical weapons production would forfeit these gains and would give the Soviet Union a propaganda advantage which it simply does not deserve. Moreover, resuming production would upset our allies, particularly the Germans, who do not want to be asked to receive additional stockpiles on their soil. Indeed, in my judgment, there is no chance that any ally will agree to such a request to receive U.S. chemical weapons. These binary weapons, if produced, will simply be useless additions to our already large existing stores.

One might hope, Mr. Chairman, that the Congress will have the wisdom, which unfortunately the administration has so far lacked, to reject this production of binary weapons. One can hope that the administration might make a virtue of this rejection if, as I trust, it occurs and use the high ground on which they would then stand to resume serious negotiations in Geneva on a treaty to eliminate chemical weapons completely and permanently. If I may just say a word about that since that is the area I have, if anything, some expertise in.

PROBLEMS OF VERIFICATION UNDER TREATY

It is clear that even if these negotiations are resumed and even if they make rather unexpectedly rapid progress, there are serious problems. There are real problems of verification, and it might take years, with good faith efforts, to achieve a treaty. Moreover, the process of destroying chemical weapons, the stocks which already exist, will necessarily take a number of additional years—I believe the Defense Department estimates more than a decade.

This is a rather slow track to chemical disarmament. It is the track I believe we should follow. It is the sure track. I believe that if we travel carefully down that track, and I am very confident there will be a lot of people watching to make sure our negotiators are in fact very careful, if we are careful, then this track need not be a dangerous one. In fact, our security will increase as we move along it.

ZONE-FREE AREA IN CENTRAL EUROPE

I would like to suggest, however, Mr. Chairman, that this is not the only track available. If the administration truly wants to reduce the danger of chemical warfare in Europe through arms control arrangements, there is another out. It is what I call a fast-track proposal which would establish a zone free of chemical weapons on both sides of the East-West line in Central Europe. Such a zone would, I believe, make far less likely the sort of chemical aggression which the administration fears. There would, of course, be verification problems even with a proposal like this. But they would be much more manageable, much less severe verification problems than those involved in proposals which seek to eliminate completely all chemical weapons everywhere in the world.

So far as I know, Mr. Chairman, the possibility of such a chemical weapons free zone in Central Europe has not been seriously studied by this or previous administrations. I would urge the Congress to explore it with the administration before approving production of new binary weapons.

I would caution, Mr. Chairman, that going into the production of chemical weapons would not be a bargaining chip, one that would strengthen the hands of our negotiators. I am very familiar with this theory, as you are, in other contexts. But I believe that to proceed along that line in this context would in fact weaken the hands of our negotiators because the predictable West European reaction to a U.S. decision to go ahead with production of binaries, which is already foreshadowed by the decisions which were recently taken by the congress of the governing party in Germany, that European reaction would weaken our negotiating position and would weaken the hands of our negotiators. If we continue to mismanage this problem, what we will have, Mr. Chairman, is a defacto chemical weapons free zone on our side of the line in Central Europe. That is hardly a position of strength, even if we have large stocks of brand new binary weapons located somewhere in the western part of this country.

Just one final note on this chemical weapons problem. Chemical weapons are singularly repellent. The world was horrified when it saw what this did to millions of human beings in World War I. But nuclear weapons are far worse. Anything that we can do to make nuclear war less likely is more than desirable. It is really, as I know you are convinced, a moral imperative. Solutions to our problems with chemical arms control can I believe point us in the right direction with nuclear weapons as well.

It is way past time for the two major nuclear powers, the United States and Soviet Union, to begin to disengage from their nuclear confrontation in Central Europe. There are thousands of tactical nuclear weapons lined up on both sides of the line, and a zone in Central Europe which was free of chemical weapons could usefully serve as a kind of precursor, kind of a test case for disengaging from this nuclear confrontation. If any such sequence of arms control agreements could be carried through and negotiated, they would really be achievements

of historic proportions. I would hope perhaps President Reagan and his staff, who are contemplating at this moment the coming trip to Europe and the President's appearance at the special session on disarmament at the UN, might give these possibilities some real consideration.

Thank you, Mr. Chairman.

Chairman HATFIELD. Thank you very much, Ambassador Leonard.

I think what we will do is to proceed through the entire panel with formal statements before we begin our questions. Admiral Davies, please.

STATEMENT OF REAR ADM. THOMAS D. DAVIES (RET.)

STATEMENT SUMMARY

Admiral DAVIES. Thank you, Mr. Chairman. It is a pleasure for me to be here. I will try to briefly summarize my statement, of which you have a copy.

I start out by discussing the virtues of the military weapons in the operational context. Many military officers feel that poison gas is a weapon of dubious merit. After its use in World War I, there have been occasional reports of its use in special cases, usually against unprepared targets. However, it has been mostly characterized by nonuse, although extensively defended against—World War II being the classic case of nonuse.

The field commander with facilities to use it must consider the trade-off between using his weapons to deliver conventional explosives or poison gas. If he uses his guns or aircraft to deliver the chemicals, they cannot be delivering explosives. When he adds to this the necessity to protect his own forces against his own chemicals, a necessity which will greatly restrict their movement and speed, he usually concludes that more conventional weapons are his best choice.

Obviously, he must take account of the possibility that the enemy will choose to use it, and so he must have his troops trained and equipped for chemical defense. Historically, such analysis has been made by both sides, usually with the conclusion on both sides not to initiate its use but to be prepared for its use against themselves. I guess World War II again is the classic case of this. That is particularly interesting since the Nazis had substantial stocks of the new nerve gas which we did not have but which they did not use.

IMPORTANCE OF DEFENSIVE MEASURES

To generate a rational policy for dealing with this, I think the first thing we need to say is that defense is the most important aspect of it. I believe in this bill that is before you now that there is considerable moneys for improvements in defensive training, equipping, and research and development. I would merely note in passing that one possibility is not included in the program, and that is development of an immunization capability against nerve gas, something I was interested in doing when I was in the previous administration.

OFFENSIVE USE

In the offensive area, however, the plan seems to be to replace our current very substantial stockpile with weapons utilizing the new binary nerve gas which offers increased safety in storage, because it is stored as two nonlethal components and only merged in the munition during delivery. The safety record of our current stockpile, of course, is excellent, so it appears that the binary will improve an already acceptable situation. It is not at all clear that it will ameliorate the situation as to forward deployment, which is one of the real problems of the use of chemical warfare, and it is not related to storage but, rather, to the anticipated usage, as has been pointed out.

U.S./U.S.S.R. TALKS ON DESTRUCTION OF WEAPON STOCKPILES

It has always seemed to me that the use of chemical weapons was an appropriate field for mutual arms control constraints. The utility of the weapon is dubious, for either side, and therefore both may well stand to gain by an effective agreement to destroy their stockpiles and facilities and thereby realistically prohibit its use. The U.S.S.R. has proposed such talks in a number of fora, and toward the end of the Ford administration we decided to initiate talks with them and did so. In fact, during the Ford administration there were the first two sessions of the negotiations on the chemical warfare treaty.

VERIFICATION PROBLEMS

From the outset, it was evident that the critical area would be verification, and this verification problem is a very real one. The Soviets are particularly concerned with it because of a well-known paranoia they have of visitors to military, technical, or industrial facilities in the U.S.S.R. But there are some aspects we are concerned about, too.

Actions proposed under such a treaty would be, first, a phased destruction of declared stockpiles, at a single location with international observers. The second would be destruction of manufacturing facilities under international observation to prevent the refurbishing of the stockpiles.

The business of having continuously present international inspectors is one that the Soviet Union found very difficult to swallow. We were working in an area in the negotiations where it looked as though we might make some progress, thereby moving the location of the inspection outside of the Soviet Union but, rather, into the PAC nations. There are a number of other opportunities that were never followed up.

The second problem of the facilities, however, is another one because there the manufacturing facilities for poisonous gas, particularly in the case of binaries, does not use very many unique facilities. That is, a great many of the things, particularly the precursors, are manufactured in what appears to be a normal chemical plant. This leaves the plants for filling munitions as the primary target for destruction or rendering inoperative. I believe that this problem is soluble, but I point out it is real, and the Russians indeed were moving very slowly and I think from their viewpoint at least with good reason.

The technical discussions on chemical warfare are still going on in a very desultory way in the Conference on Disarmament, but the bilaterals with the U.S.S.R. are completely dormant, so that something needs to be done to revive those.

CHARGES OF SOVIET USE OF CHEMICAL WEAPONS

Now, there is one very important item that should be undertaken earliest. The reports of the use of lethal chemicals by the Soviet Union or its client states, in apparent violation of both the Geneva Convention of 1925 and the Biological Warfare Treaty of 1972, needs to be cleared up before going much further. There was a UN group established to look into these reports, but it is not moving very rapidly.

As I mentioned before, recent reported uses of chemicals seem to be restricted to use against primitive and unprepared targets. Where both sides are modern, sophisticated forces, the degree of defensive preparation is such as to render any employment of chemicals unproductive. Reports from Afghanistan, Laos, and Kampuchea fit this pattern. Details, however, are difficult to rationalize; and, consequently, there are many who find these charges of noncompliance unpersuasive. I have not been privy to the latest information on these so that I really cannot comment at this point. But in spite of the charges of non-compliance and the difficulties of verification I have outlined, I believe the problem can be overcome by persistence and innovative thinking.

While the development of improved defensive measures should go on as well as increased training and equipping, I believe that the most productive course in the offensive area would be a resumption of negotiations. We already have an adequate stockpile, and its location or distribution is not likely to be improved by the introduction of binaries. Nor in my opinion will the start of binary nerve gas production frighten the U.S.S.R. into more productive negotiations. In fact, the most likely outcome is the U.S.S.R. will start some equivalent production of its own, increasing the already large stockpiles and adding to the difficulties of ever constraining this weapon.

This concludes my prepared statement. I will be glad to answer any questions.

Chairman HATFIELD. Thank you very much, Admiral Davies. Mr. Hormats.

STATEMENT OF SAUL HORMATS

CHEMICAL WARFARE

Mr. HORMATS. Thank you, Senator. I do not have a prepared statement. What I would like to do is talk on something that bothers me very much.

I have been reading for the last year all the rationale by the proponents of the binary program on reasons for and supporting reasons for pushing the program and funding and all of that. It disturbs me that no one talks about what chemical warfare really is all about.

I read in all the presentations that I have been able to come across a great deal of mythology, exaggeration, the tremendous amount of misunderstanding of the use and effectiveness of poison gas in war. That is what we are really talking about. We are not talking about programs and funding and the like. We are talking about a real war and how chemicals would help us, I presume, win that war.

USE OF CHEMICALS IN MODERN WARFARE

I would like to start off discussing the first use of chemicals in modern war. That was in 1915 when the Germans launched in April 1915 the first gas attack against the ally lines. They achieved a remarkable degree of surprise. The allies were completely unprepared, completely unprotected, and when that gas cloud went across from the Germany trenches to the ally trenches, about 5,000 casualties ensued. But, more importantly, there was tremendous panic and the ally lines broke. There were two divisions that broke. Fortunately, the German high command didn't believe how great the results had been of this exercise of theirs and they failed to exploit the situation. And then the allies brought up some reserves and closed the line, and that first attack was over.

From then on chemicals were used almost actually throughout the rest of that war. Tremendous amounts of poison gas were used and masks and the protective gear that both sides had were very effective against the 10, 20, 30 to as much as 50 percent gas that was used in the rest of the war.

EFFECTIVENESS OF GAS WARFARE IN 1915-18

When the war was over and people summarized what had happened, of the 3 to 6 million casualties in World War I, a little over 1 million were gas casualties. Considering the tremendous effort and tremendous tons of chemical poison gas used, the indications were then to many observers and certainly to people who looked back on what happened that gas is not a very effective weapon of war. It wasn't then, and with the more sophisticated and far better armies of today it is even far less effective than it was in 1915-18.

WORLD WAR II MUNITIONS STORAGE

In World War II, when we and the Germans had tremendous stores of poison gas munitions, we had so many that they were buried and stacked all over England. One of my friends came back from there and said he wondered how the island failed to sink because of the terrific amount of poison gas bombs that we had shipped over there.

I was part of a group during that war, in addition to many other things I was doing, whose job it was to assess the capabilities of munitions we had and how they would fit into a European war. Half of the group were scientists and technicians like myself—British, Canadian, American, Australian, New Zealanders, and the like. The other half was a remarkable group of young officers pulled back from the front who had had real combat experience and they had shown ability for leadership and for military planning.

We worked together to see how the munitions we had could be used in defeating the Germans and winning the battle. We were working at the battle level rather than a division front level because the divisions in army wars are really just a summation of smaller battles. We never could find any instance where in a battle that had been fought or one that we thought might be fought that chemicals would have a decisive role. They just didn't. And the military part of our team, the British particularly, and the Canadians, who knew very much more about this sort of thing than just any one, I suspect, of the American team, were very reluctant to use chemicals. All we would do would be to confuse the battle and prolong the battle. They could not see what military value there was for prolonging the battle because it merely meant they would suffer more casualties, and why should their men die for no reason. And this attitude of ours, I am sure, went from our separate and our joint commands up to the military leaders and was, I suspect, the primary reason that we did not use poison gas in World War II.

I was in Germany a week after Berlin fell. I tried to talk to my German officer member and I couldn't find him. It was only much later I realized they were probably all incarcerated as war criminals. I still remember the realization that had the war gone the other way, I would have been incarcerated. But I spoke to some of their subordinates and I was surprised to find the German military felt the same way we did, that they could not find any particular merit in using the vast stores that they had.

There were rumors, as you all know, that Hitler had been poisoned and he was reluctant to use gas, that his astrologer was against it. I don't know how valid those things are. But I am quite certain that the German high command had no illusions about whether the poison gas stores they had would have done them any good.

U.S. BINARY PROGRAM

So now we come to the binary program and what is being proposed to you gentlemen now. I was horrified when I heard many months ago a statement by the administration that we needed this program to enable us to retaliate in kind against a Soviet gas attack. This to me is a violation of the most important precepts I know of war. You never tell an enemy what you will do if he does something. This ties our hands and formulates our policy at his will. And this is, I am sure, what the Russians have seen and what others see as happening. Retaliation in kind should never have been announced.

Furthermore, retaliation in kind is of no military value. I have tried to develop scenarios for when the Russians might launch their first gas attack against us, and the best I can determine, and I have studied quite a bit on Russian military techniques, is that they would probably wait and not use chemicals if the war against the allies of Europe was progressing satisfactorily. If, however, we could slow down and perhaps stop the Russian advance, they would then have two alternatives. One is to go for a stalemate, which would be disastrous to them politically, or escalate, which escalation with nuclears would be disastrous to them in terms of loss of people and materiel.

But we are now suddenly giving them a beautiful out. We are saying, "You use chemicals against us and we will use chemicals against you." That is what we just told the Soviets. They will then, I am sure, since the Soviet military leadership is very smart, wait until we are least prepared to defend ourselves. If the battle of war has been stopped but the fighting hasn't stopped, there will be intense battles between all kinds of groups again in this enormous front. Artillery will be firing. Our artillery will be firing at the maximum effort and our machine guns will be in place to do the fighting as hard as they can. It will be perhaps, I think, the most critical part of that war against the Soviets. And the last thing our people will be worrying about is where the gas masks are. They will be too busy to worry about where the munitions are so they can keep firing or where the munitions are for their machine guns and whether their aircraft are still operational and doing their job, all that sort of thing, and not worrying about whether their gas masks are immediately at hand.

I am sure this will happen, and I am sure this would be the opportunity the Soviets would pick for launching that attack. The Soviets generally don't launch an attack on a small scale. They go all out. They might even try to go all out and repeat the German attack on the allies of 1915. I don't know whether they will succeed in breaking our lines. I don't think they will. But they will, I am certain, achieve a very large number of allied casualties in that first chemical instance.

They will plan this thing, I am sure, properly. Before munitions are fired, they will alert all of their forces to go on chemical alert. This means that every soldier will be told to make sure his mask is close at hand and that it is working properly, hasn't been torn, and all of their tankers will make sure their tank protectors are working, and so on down the line. Then, as soon as their weapons and munitions are launched, an order will go out to go on full gas protection. And with the dual discipline system the Soviets have, every soldier in that vast army will have his mask on and every tanker will be in his tank with the hatches buttoned down. And when we retaliate in kind 3 or 4 or 6 hours later, the entire Soviet force will be in complete protection. We will get no casualties against them. We will be responding, retaliating symbolically. I can't see how you defeat the Soviet force with symbolic weapons, with symbolic retaliation.

And the Soviets are quite aware of this. I suspect that this idea of us building binary weapons and using them for retaliation in kind is one of the most pleasing things the Soviets have heard in a long time. If I were a Soviet general, I would like it.

USE OF PROTECTIVE APPAREL

Now, apparently the proponents of the program are also starting to realize that maybe after the first attack we won't get very many Russian casualties, so they are now talking of something that in all my years in this business I had never heard of as being a serious military effort. They are talking now of requiring the enemy to suit up and, two, they are going to reduce his combat effectiveness and they are going to harass him.

I have been trying to find out just ponderatively what all of this means, and I must say I am at a complete loss. In the Russian army I knew when I was working some 10, 15 years ago, the full gas defensive array looked very much, as I recall, like what a Marine group is wearing in rainy weather, except they had masks on. As I remember the Soviet soldier, his prime gas protection is his mask and his poncho. The poncho that I recall was a tent hat and a ground sheet. This is a very effective defense against the kind of chemical munitions we all are talking about now, against the G's and the V's. The heat and burden and degradation of a Soviet soldier wearing this, I am sure, in a combat situation will be minimal.

Yet here we are talking something about getting 50-percent degradation of their forces in combat abilities. I don't understand where those numbers come from and I don't believe them. This is what we call forcing them to suit up and get this degradation and combat effectiveness, and also we talk of harassing. Harassing them, as I understand it, means that the Soviets are building air strips somewhere in Europe and we want to keep them from servicing their airplanes and we send over one of our planes and a lot of nerve gas bombs. We drop them on the air strip and then the Russians are so busy cleaning up and everything else that they don't have time to service their airplanes with the munitions and fuel and that sort of thing.

I don't understand that. In the first place, to get our bomber over this air strip and to drop these bombs, that is going to be a very, very dangerous thing. The antiaircraft defense on these things is going to be very, very good. So the bomber comes over and drops let's say 10 bombs onto the target. And, incidentally, the design I have seen of the Bigeye bomb horrified me. I have never seen anything that is going to be so uncertain in its operation. I suspect we may get 90 percent duds from the design, the complex design of that thing.

But aside from that, let's assume that all bombs are dropped on the air strip. The bombs, as I understand it, will come down and spray out some agent from some orifice on the side. Some of it will come on the ground and some will float off in the air.

With a 10-mile-an-hour wind, which is a very moderate wind on an air strip, that part that is floating off in the air will be carried 10 miles away in an area and blow off that air strip in 10 minutes. That stuff contaminating the ground can be very easily handled by the Soviets. All they have to do is fill one of their sprayers that they have so many of with bleach. Bleach is the same stuff we use for cleaning up our swimming pools. They can spray the contaminated region around the bomb. You will be able to see the path of where all of this is. And then the air strip is clean. And that means that to do it over again, we have to come back every 20 minutes, 30 minutes, or every hour.

But all we are doing is annoying the Russians. I do not see how we can win a war against the Soviet Union by annoying the Russian soldiers.

I have a note here saying that I am running out of time. Thank you very much.

Chairman HATFIELD. Thank you very much, Mr. Hormats.

Let me just run a round of questions through each of you and then I will defer to Senator Pryor for the same format. We will move through the questions in that way.

DETERRENCE OF SOVIET UNION

First, Ambassador, let me ask you this question: You seem, justifiably I believe, suspicious of the Soviet motives in the chemical weapons area and critical of their intentions. We hear this from the administration, of course, but what would you say would be the essential difference between your position as you have stated it here today and the view of the administration in terms of the best way to deter the Soviet Union? What is our best way of developing deterrence if we all have mutual suspicions toward the Soviets? The administration says build binary weaponry to enhance that deterrence. I gather from your statement you do not feel that is required. And yet we have that mutual suspicion.

Mr. LEONARD. Mr. Chairman, it seems to me that the fact that we do have stockpiles of chemical weapons provides the kind of deterrence that really is necessary. The stockpiles may be rather limited in size. I don't think it matters that they are limited in comparison to what many people think are the Soviet's stockpiles. Simply the possession of that stockpile ready to use is I think enough to eliminate any military advantage to the Soviets, a military advantage which the previous witness has just been describing with his vast experience in this area as extremely limited and marginal in any case.

Therefore, it seems to me we have effectively deterred the Soviets from the use of chemical weapons in Western Europe, central Europe. What we may not have done, of course, is deter them from these possible uses of chemical weapons in remote parts of the world. That is where historically over the last 30 years chemicals have been used. As you know very well, there are many reports to that effect again today. And for that I think exposure, exposure in a serious nonpolemical fashion, with a maximum of impartial scientific effort brought to bear on the question, is by far the best means of deterring this sort of thing.

There is, unfortunately, very little military advantage to using chemical weapons against prepared opponents. But there does seem to be some in using them against totally unprepared opponents in remote parts of the world where it is difficult to get with ordinary conventional weapons. It seems to me that is what is far more dangerous. It is a danger really more for the Third World than for the United States and our allies and the possibility of the Soviets using this in central Europe.

U.S. STOCKPILE

Chairman HATFIELD. In your testimony, and now again, you make an assessment of our present stockpile. Would you delineate between that stockpile which you consider to be adequate today for deterrence and the popular view that prevails in many areas of the country that somehow our stockpile is but a system of leaking cannisters and deteriorating

weapons that are really insufficient to be a deterrence? I think we have to delineate between cannisters and rockets and projectiles which all are kind of classified in the same group as it relates to the storage and the leaking problems that we have had, some in my own State, as it relates to rockets and cannisters. Would you make a comment on that?

Mr. LEONARD. You have a series of other witnesses here, every one of whom are much better qualified than I to address the precise problems. But certainly the weapons that really make a difference in terms of our stockpiles are those that are ready to use. There is a limited but substantial stockpile of weapons ready to use in Western Europe. And that, it seems to me, is an adequate deterrent in the sense which we are discussing it here. And adding to these large stockpiles in the Western United States does not seem to me to enhance our deterrence at all.

Chairman HATFIELD. Thank you.

U.S. DEVELOPMENT OF CHEMICAL RESERVES

Admiral Davies, according to the administration, the general view that is expressed is that we must build up first and negotiate later. That is sort of an oversimplification, but that is pretty much embodied in the Jackson-Warner proposal and a few others floating around here. First of all, I would like to have you comment on that as former Director of the Naval Weapons Programs. Second, I would like to ask you more specifically that if the Europeans do not permit forward deployment of the binary weapons, munitions, and it has been suggested then that we could forward deploy them on carriers, what is your view as to the ability to deploy them on carriers and this whole general question of buildup and negotiate later?

Admiral DAVIES. I think that building up and negotiating later really is talking about people, not specific weapons. In general, history tends to demonstrate that if you build up, the other person tends to build up too, that the response is not the passive one of saying, "Well, you have built up now and we don't have any choice but to negotiate."

I think that negotiating from strength has historically not been very productive. I mentioned in an earlier hearing that the Versailles Treaty was one of the examples of a treaty of negotiating from strength.

On the other side, I believe you have to use the same kind of analysis on the carrier problem that you would in any of these things, and that is a case of sort of instead of what. If you are going to deploy these on a carrier, you are going to take a substantial chunk of the carrier's capability that it has today and turn it into a very extensive storage, because they do need to be very carefully stored and guarded. You are going to take that out of the carrier, something else out of the carrier, and put this in.

Now, obviously, if the chemicals were urgently needed and were vital to the program, I am sure that everyone in the Navy would be delighted to go along with that. So if you find that the chemicals have the reputation that I believe they have—namely, of being weapons of very dubious merit, such that people of their own volition didn't use them in World War II, for example—I think you are going to find it pretty hard to get anybody to put them on a carrier.

Chairman HATFIELD. Senator Garn, do you wish to ask these gentlemen questions?

Senator GARN. Yes; thank you, Mr. Chairman.

CONDITION OF U.S. STOCKPILES

I apologize for not being here during your testimony, gentlemen, but I had an Intelligence Committee meeting that was impossible to get away from because of the nature of the briefing. I am sure we could get involved in an endless discussion of detail today, but I will not. From the conversation I have heard so far, I would like to ask some general questions.

With respect to the question about our current stockpile as far as being leaky, unreliable, or whatever, I do think I may know more about that than anybody in the room, because virtually all of the stock happens to be in my State, 35 miles from Salt Lake City. I have viewed it personally. I have been in the shelter where these stocks are stored. I have gone through the emergency procedures that are used. We have had that stock there for more than 35 years. There has been no accident of any kind to anyone under any circumstances during that period of time. There was much debate over the issue of whether the Weteye bombs should be moved to Tooele Army Depot from Denver. Many people were opposed to that move, except the people who live in Tooele, Utah. These people had lived next door to this for 35 years and many of them had their jobs depending on this. It became a great political issue.

The issue of whether they were leaking or not was a nonissue. The few leakers that they found were greatly played up, and yet they were leaks in the magnitude that could not have been detected a few years ago because we did not have the equipment to measure in parts per billion and parts per trillion and parts per million and so on. And there never were any leakers outside of the cannister in which the Weteye bomb was encased.

Even in that event, the worst leaker they had; you could have put a human being inside that cannister, sealed them up and left them for at least 8 hours with no damage whatsoever to them. So there has been a lot of politics about the stock of Utah with respect to its being dangerous and so on. It is simply not true. I will walk in any one of those bunkers any day of the week. I would have a much greater fear of passing a chlorine tanker on the freeway or the trains with chemical agents traveling through our towns.

As far as being a deterrent; I don't see them as a deterrent because it is one thing to store them safely; it is something else to be able to deliver them. I am sure that the Soviets are very well aware that some of the munitions—and I have to be careful here not to go into any classified information—but some of the munitions that are stored there, we don't have the equipment any more to fire them. And so a large part of that stock is absolutely worthless as a deterrent and might just as well be detoxified. I wish it would be, because there is no reason to continue to store it if there is no weapon to deliver it. I am sure you gentlemen know what I am talking about without identifying particular systems.

So I very much feel that the Soviet threat is there. I think there is ample evidence that without us producing new systems, they have done so, and we can argue about whether or not we should try to deter. I won't attempt to get into that today. I would only say it seems to me if we do have a national policy, and we should, that it only makes sense to build a binary system that is safe so we don't have the problems of delivery or the possible potential problems to civilian populations.

NEGOTIATING FROM POSITION OF STRENGTH

Then the other question I would like to ask, in response, Admiral, to talking about a failure of negotiating from strength; I think that is evidently true, through most any other arms control agreement historically you want to look at. In most cases arms control agreements have merely gotten both sides to give up weapons systems that are obsolete and they were going to give up in any event. I think it has never slowed an arms race.

If we can't negotiate from strength, where is the logic that we can negotiate from weakness? In a very general sense; where is the answer? How do we attempt to get the Soviets to stop building?

You are correct when you say one side builds and the other side builds. But in virtually every weapons system, and this is a matter of fact, that in every area we have made unilateral decisions to stop weapons system: since 1969; the Minuteman III production line and 1,054 land-based ICBM's, there is no evidence, not one single bit of evidence, the Soviets had ever reciprocated by stopping any corresponding weapons system that we had unilaterally stopped.

Where is the incentive? Weakness, strength? How do we do it? I want arms control. How do we get them to stop?

Admiral DAVIES. Certainly not by emphasizing weakness, as you say. That is quite true. There is no argument on either side I think in doing that. The basic motivation for a negotiation in arms control has to be that both sides see a benefit in it. When they do, they will negotiate. If they see no benefit, they won't.

Now, the basis of unilateral actions, I don't regard those as unilateral actions from which we expected any response from the Soviets. If we did, we were barking up the wrong tree. The actions taken in regard to our missiles and our submarines and almost everything, our bomber and whatnot, were taken on the grounds that we had enough and these things didn't add anything to our capability. I don't think anybody at the time the decisions were made, and I remember a number of these around the Pentagon, believed that if we did this, the Russians would stop doing something. I don't think that was expected and it certainly didn't happen.

The Soviets, at the time of the signing of SALT I, you may recall, Brezhnev made a point of saying they had a lot of improvement items under construction and that they intended to carry that program forward, in spite of this limitation, the limitation being on the deployment in terms of numbers of silos and so on, and they did. They carried it forward, exactly the program they said they were going to. So it

shouldn't have been a surprise to anybody. It was a modernization program. And at the same time we were doing modernization, too. So I think the problems are a little bit stirred together there.

Certainly I don't advocate, and I don't know many who do, real unilateral moves on the basis of the fact that this will inspire the other side to be nice, too, because I don't think that will work. But if you can do effective arms control, and the sort of thing we are talking about here is effective only if you can actually physically eliminate the arms, as we are talking about in the chemical stockpile, eliminate the stockpile, eliminate the ability to refurbish it, then you can't be surprised to have it suddenly used on you. That is effective arms control.

I believe you can do that and that you can only do it, though, when it is clearly to the benefit of both parties. I think it is in the case of the chemicals we are talking about today. I think it has been in a number of other cases. But there is a lot of them in which it wasn't.

The other thing I would like to add is to try to do it as early as possible. If you are talking about negotiating from strength or weakness, I think the best thing is to try to negotiate as early as possible, before a condition of strength or weakness on either side really exists. That is what we did in the Weather Modification Treaty, as you may remember. That one I think has a chance of producing some good results. But again, the results will be not the sort of things you can quote statistics on because they will be things that didn't happen because of the treaty, not things that did.

Senator GARN. I would beg to differ with you, that there wasn't some expectation the Soviets would stop. There is ample testimony, you can go back and read from the record on the debate on the ABM Treaty, Senator Fulbright, Melvin Laird, Senator Jackson who is still in the Senate, talking about why the ABM Treaty was necessary on both sides to give up.

The whole theory—and this was not my idea, this is just quoting or paraphrasing from that testimony—was that if we did not build an ABM capability, if we did not defend ourselves, then the Soviets would have no reason to build hard target kill capability. They simply would not have the need to do so.

The theory is that if they don't have a sword long enough to reach us now, then if we do not build a shield to protect ourselves they will not build a longer sword. If they did so, that would be a clear violation of the spirit and intent of the ABM Treaty.

Wouldn't you agree that the SS-17, 18, and 19 are clear extensions of that; the SS-18, built for one purpose and one purpose only, to threaten our Minuteman III field—yet that is exactly what we expected them not to do. They would not build that capability. But if we put an ABM system over it, then we would force them to try and build that kind of weapon to hit our Minuteman III.

Admiral DAVIES. That is an interesting stirring together of a couple of arguments, really. But I am not privy to the discussions you mentioned.

Senator GARN. It is in the open record.

Admiral DAVIES. I was talking about discussions in the Pentagon when we were talking about building or MIRVing the Minuteman and various things and how many warheads we would put on and that sort of thing. But basically the ABM Treaty was supposed to produce by bilateral agreement a stoppage to a system that the Soviets already had underway, which it did. I think it was a success. I don't certainly believe very many people thought it would stop them from doing something in the way of the SS-17 and 19, and whatnot.

Senator GARN. All I can do is quote the record.

Admiral DAVIES. It is quoted by Mr. Brezhnev as things they were going to do at the time of the signing of that agreement. But if people expected it, they simply expected wrong, that is all.

Senator GARN. It is clearly in the record. I was plowing streets and filling chuck holes back in Salt Lake City. I go back to the historic record.

I am sure my time is about up. But let me get back to the point then. No one could agree with you more that effective arms control means the reduction of existing stock. That has yet to occur in the arms control agreements I have seen. It certainly did not under SALT I.

Admiral DAVIES. It did occur under SALT I, sir, if I may interrupt for a moment. There was destruction of missiles, as you know, under the agreement, that as they brought in submarines, they would take land-based ones out. There were some 200-odd missiles destroyed.

Senator GARN. I go back to my opening statement, admiral. Those were weapons systems that were obsolete, single warhead launchers, things of that nature. Just like SALT II, yes, it is a fact they would be required to remove approximately 10 percent of the launchers, 250 launchers, single warhead launchers that were relatively ineffective, grossly inaccurate. Then you increase the sub limits to 820 land-based ICBM's, allowing 10 warheads. So you cut the launchers by 10 percent and increase the number of warheads really allowed by both sides. We realize a huge arms buildup.

I don't think that is an effective arms control to say yes, we reduced some weapons. That is like giving up World War I rifles in place of more modern ones. Sure, that is a fact, but not as far as an effective thing.

But to get back to my question. I would prefer not to build any type of chemical weapons, safe, unsafe, or otherwise. The fact of life is, to try to be pragmatic, the Soviet Union's offensive and defensive capabilities are far ahead of us. How do you think we get them to remove that?

Admiral DAVIES. I am sorry, but I don't agree that the Soviets are far ahead of us except in the defensive area, and I think that is one we do know something about. They have done a very thorough job. That is one we need to do a lot of work on ourselves. I believe we are doing it now.

The position that I advocate is that we go ahead with negotiations of the arms control treaty that we started on a number of years ago in the Ford administration. I think we should continue that.

Senator GARN. What incentive, again from a practical standpoint, is there for them to give up their capability if they get nothing in return from us?

Admiral DAVIES. Well, what they will get in return, of course, is we give up our capability, the very thing I talked about earlier; namely, the destruction of stocks on a mutual basis. That is what they get from it.

Senator GARN. They are well aware that a good part of our stock cannot be delivered because we do not now continue to have the batteries in Europe that can deliver them. I may have a basement full of ammunition and say yes, I will destroy it. It doesn't matter. I don't have any rifles to shoot it with.

I am talking about a credible deterrent to say, "We will give ours up if you will give yours up." That is the only trouble I had with my friend and colleague's freeze proposal. Ten years ago, I think a freeze proposal would have been great, and I would have supported his resolution to try and help him.

But when they have an SS-18, the two most destabilizing weapons—forget all the rest of them—an SS-18 and SS-20, we haven't yet installed the Pershing or MX—I certainly would prefer not to build the MX—but from a practical bargaining standpoint, where do we find the incentive to get them to remove them unless we have something in return to give? That is the whole history of human nature in this body, in the legislative body, more than anything else is we work back and forth between the minority and majority. We usually have something to trade.

I have a markup on the housing bill tomorrow in the Banking Committee. Believe me, in order to get a bill, it has to be a give-and-take. Unless I have something valuable that my Democratic colleagues want, they are not going to give me anything back. If I go buy a car, I have to have a downpayment and ability to pay before the dealer will let me take it. In any of our human negotiations, that is human nature to do so.

I would prefer not to build any one of those weapons systems. How do we get them to remove their SS-18's and SS-20's unless they see some benefit to them and the two counters to that we haven't built?

Admiral DAVIES. I think that the flaw in the argument is you exaggerate the virtues of the SS-18, for example, and you also have an opinion I don't share of the strength of the Soviet chemical stocks and their ability to launch them that you believe is much better than ours. I don't believe that.

Senator GARN. How do I exaggerate the SS-18 when—

Chairman HATFIELD. Excuse me. I wonder if we could go back to the binary gas question here because we have another panel.

Senator GARN. I will stop after this question, in any event. But there are 3,081 million-ton warheads aimed at that country now. I underestimate the effectiveness of the SS-18?

Admiral DAVIES. Yes.

Senator GARN. Three thousand eight-one million-ton warheads are not important?

Admiral DAVIES. Yes, sir; because we had an opportunity to build SS-18's ourselves and chose not to. Our Department of Defense, which I think has done a pretty good job of shaping our nuclear response, decided they would go for accuracy and small warheads a long time ago and put them at sea. We did that.

Senator GARN. Excuse me.

Admiral DAVIES. We have the opportunity to build big ones——

Senator GARN. Excuse me. That is the standard answer I have heard 10 times in a million debates on this issue. You are absolutely correct. We made a decision not to build those large weapons because we didn't need to. We made up for it with technology and accuracy. The Soviets built big because they did not have that capability. Their argument was fine a few years ago but not with the Mod-4 to the SS-18. When you now couple that size with accuracy comparable to ours, then you have changed that picture and it is no longer a valid argument to the SS-18 being effective. It is now accurate and big.

Admiral DAVIES. I don't agree on accuracy. I think we had better let the chairman go on.

Senator GARN. Are you still privy to the latest briefings?

Admiral DAVIES. Yes; not the latest, but let's say up to about a year ago I was privy to them.

Chairman HATFIELD. Senator Pryor.

DEPLOYMENT OF CHEMICAL WEAPONS OUTSIDE OF EUROPE

Senator PRYOR. Mr. Hormats, this is my second occasion to have the honor of hearing you and your statements relative to chemical warfare. I know that you have done an awful lot of work in your lifetime on this issue. I would like to ask one or two questions of you.

Is there any strategic value to deploy our present or a new stockpile of chemical weapons in any area other than Europe? And perhaps the two other panelists might want to comment on this question.

Mr. HORMATS. I have thought of that for some time, and also the question should we destroy our present stockpile. I would like to answer the second one first.

I don't think we should destroy the stockpile because, to answer your first question, I don't know who our enemy will be 10 years from now. We seem to change those very frequently. And perhaps if we could decide who we would be very unhappy with 10 years from now, we might deploy our weapons in an appropriate region.

Senator PRYOR. Do we know how to destroy the present stockpile?

Mr. HORMATS. Yes; but it is very expensive. It costs billions of dollars to do it.

Senator PRYOR. Billions of dollars?

Mr. HORMATS. I have read estimates of \$2, \$4, \$8 billion. I don't know. It is very expensive. It will take a long time to do.

Senator PRYOR. Do you feel, as Admiral Davies feels, that our going into the production of a new generation of nerve gas or chemical weaponry will frighten or not frighten the Soviets?

Mr. HORMATS. If I were a Soviet general, I would be very pleased with that program. It would not frighten them.

Senator PRYOR. Why would you be pleased?

Mr. HORMATS. It seems we don't intend to continue production of gas after that first attack. The only casualties will be obtained from that first strike. It depends on whoever makes that first strike. If the Russians do, they will gain a lot of casualties on us, and if we make the first strike, we will gain a lot of casualties of theirs. After that, all sophisticated armies are invulnerable to chemical attack. There will be very, very few casualties. It will be pretty much a waste of fire power if the war continues. And if the Soviets can induce us to think we are going to continue to use chemical weapons when they are using effective weapons, it will be to their advantage.

U.S. DETERRENT CAPABILITY

Senator PRYOR. Is it your opinion we have today an adequate supply or an adequate stockpile of chemical warfare agents to serve as a deterrent to the Soviets?

Mr. HORMATS. I don't know what we mean by deterrent. If you mean by deterrent to keep them from the first strike, no. But to keep them from continued use of it, well, on the first strike also, yes, to deter them from continued use.

Also, I don't see the point of our stockpile. A proper deterrent on their use of gas will be an effective deterrent, and chemicals are not going to be an effective deterrent. That is the whole point of it.

DESTRUCTIVE POWER OF CURRENT U.S. STOCKPILE

Senator PRYOR. How many people can our present stockpile of nerve gas or chemical agents destroy, or does it have the capability of killing?

Mr. HORMATS. You mean unmasked, nude people? An awful lot.

Senator PRYOR. Let's say unmasked.

Mr. HORMATS. Unmasked people, a tremendous number.

Senator PRYOR. Millions?

Mr. HORMATS. Perhaps, yes. But masked, just those that will be caught by accident.

Senator PRYOR. Mr. Chairman, I may have questions later. I assume these witnesses will be dismissed. But I look forward to hearing Dr. Meselson. So I will maybe later ask some questions in writing, if possible.

Chairman Hatfield. I will excuse this panel for a few moments and then we will call a second panel. Then we may have further questions, if we could, please.

Thank you, gentlemen.

HARVARD UNIVERSITY AND UNIVERSITY OF SUSSEX, ENGLAND

STATEMENTS OF:

MATTHEW MESELSON, THOMAS DUDLEY CABOT PROFESSOR OF THE
NATURAL SCIENCES AT HARVARD UNIVERSITY

JULIAN PERRY ROBINSON, SENIOR FELLOW WITH THE SCIENCE
POLICY RESEARCH UNIT OF THE UNIVERSITY OF SUSSEX, ENGLAND

INTRODUCTION OF WITNESSES

Chairman HATFIELD. I would like to now invite Prof. Matthew Meselson and Dr. Julian Perry Robinson to come to the table.

Prof. Matthew Meselson is Thomas Dudley Cabot Professor of the Natural Sciences at Harvard University. He is generally credited with having played a key role in the political process which led to the signing of the Biological Weapons Convention in 1972.

Dr. Julian Perry Robinson is a senior fellow with the Science Policy Research Unit of the University of Sussex, England. He is a specialist on military technology and arms control. Before joining the faculty at Sussex in 1971, he was head of the project on the limitation of biological and chemical arms at the Stockholm International Peace Research Institute.

Gentlemen, we have your full statements, which will be made a part of the record. If you would care to highlight or brief it, we would be very happy to hear from you. First Professor Meselson.

ADMINISTRATION POLICIES ON CHEMICAL WEAPONS

Mr. MESELSON. It is a privilege to be here today in connection with your consideration of the administration's request for funds to begin production of certain binary chemical munitions. This is a subject which I think needs a considerable amount of clarification and information.

I must say that I thought Senator Garn's statement about the so-called hazards of our current stockpile was the most concise, informative statement I have ever heard on the subject. Men who work in the sheds containing our stockpile weapons do not routinely wear gas masks. And as the Senator said, there has never been a serious accident resulting from storing, production, or movement of those weapons.

ADMINISTRATION POLICY

I agree with the policy of this and previous administrations in two important regards. I disagree with the policy of this administration in a third.

I agree with this and previous administrations on the necessity of assuming the existence of a substantial Soviet chemical threat. But we should deplore the common practice of putting forth to the Congress and the public worst-case interpretations for which the evidence is flimsy or even misrepresented. The reason we should deplore this is the departure from the highest standards of evidence and interpretation in any kind of intelligence work eventually can only harm our own interests. The fact is that we don't know whether the Soviets have or have

not significantly added to their stockpile of lethal chemical weapons in the last dozen years since we stopped. Maybe they have; maybe they haven't. We just don't know.

Similarly, estimates of the size and composition of Soviet chemical stocks are extremely variable and uncertain. Indeed, we don't know whether the Soviet stockpile of chemical weapons is larger or smaller than that of the United States. It could be bigger. It could be smaller. It is not definite knowledge about any of these things, and I am glad to see some indications that some administration spokesmen are beginning to speak in this language instead of the exaggerated language of recent months. It is prudence, not definite knowledge, that requires that we assume the existence of a substantial Soviet chemical weapons capability.

But that doesn't help us decide on specific procurement issues. To decide whether to buy this or that weapon requires a detailed understanding of what is the purpose of the weapon, the missions for which it is intended to be used, the effectiveness in those missions, the effectiveness of competitor weapons, plus a variety of political considerations that are less technical. But I do agree we must assume the existence of a substantial Soviet chemical weapons capability.

I also agree with the determination of this administration and its predecessor that increased effort must be given to equipping and training U.S. forces to protect themselves against the effects of chemical weapons.

ADMINISTRATION PLANS FOR NEW GENERATION OF CHEMICAL WEAPONS

However, I begin to disagree seriously when it comes to the plans of the current administration to go forward with major outlays for a new generation of nerve gas weapons.

The administration has requested in this coming fiscal year, fiscal 1983, \$54 million for initial production costs of two new chemical weapons. One is the artillery projectile and the other is a bomb. The Bigeye bomb cannot be certified as ready for production until fiscal 1984 or later—probably later. There has been delay in its development and testing. This delay and serious unresolved doubts about the deliverability and effectiveness of the Bigeye bomb argue, I would say, that we shouldn't consider the issue of Bigeye funding in fiscal 1983, that the consideration of it should be deferred to fiscal 1984 when the studies are farther along and when the possibility of its certification for production is more near to the horizon.

That is all I plan to say about the Bigeye bomb. I think it should be discussed carefully, but I don't see any need to go into it in this fiscal year.

ARTILLERY PROJECTILE

Regarding the artillery projectile, it is certified ready for production. We could begin producing it. We could begin spending money to produce it. But I must say that I believe that production of this particular chemical munition would not contribute significantly to U.S. defense.

The initial cost isn't much, but as you go to the outyears, you are talking about spending several hundreds of millions of dollars or possibly a billion, or \$1.2 billion, depending on how many you buy, and, of course, depending on whether there are or are not any cost overruns beyond the present scheduled price of about \$550 per projectile.

The reasons I think the projectile would not add to our defense are as follows:

First of all, existing stocks of 8-inch and 155mm chemical weapons are substantial enough for us to have a 30-day, full-scale war in Europe. Now it is true, as Senator Garn quite correctly pointed out, there are munitions—it is not a matter of classified information so I am free to talk about this. I should add, I have served as a consultant on chemical weapons matters to this administration and, I think, to all administrations starting with that of President Kennedy. But it is not a matter of classified information that the U.S. Army has withdrawn its multiple-rocket launchers, and this means that whether or not the chemical rockets we have are deteriorating, that it is irrelevant because there is nothing to launch them with.

It is also true the Army is retiring the 105mm canon. It remains, and will remain, a standard weapon for the Marine Corps but not for the Army.

HEAVY ARTILLERY

But I am not talking about rockets and I am not talking about light artillery. I am talking about heavy artillery, 155mm and 8-inch.

It was once thought—and it was a common misconception often repeated—that those artillery projectiles were becoming obsolete due to range restrictions. That is not at all true. No one will tell you that anymore. It is just not true. The existing stockpile of 155mm and 8-inch is not becoming obsolete and it is not significantly deteriorating.

This is a photograph of some stocks, in fact in Senator Garn's State, in Tooele's Army Depot in Utah, of the 8-inch artillery projectiles containing GB's. Those were made at the Rocky Mountain Arsenal, I think, in 1966.

There are large, either serviceable or to be made serviceable, stocks of 8-inch nerve gas and 155mm nerve gas artillery projectiles. With proper maintenance, these munitions should be serviceable for many years to come. Indeed, the proposed binaries have a certified shelf life requirement of 20 years. I think it altogether possible that our existing rugged, simply designed chemical munitions will outlast the binaries. That is an altogether possible prospect.

I am also concerned that the M687, which is the proposed artillery projectile, has not been adequately tested. There has not been a single field test of that weapon in its actual configuration. There have been many tests with simulants. Those are recorded by numerous individuals who have been associated with this program both as advisors and full-time employees as inadequate.

Finally, a different sort of consideration, not a technical one, but it would seem that the allies of the United States in Europe are very unlikely to accept any prepositioning of additional U.S. chemical weapons.

And that, of course, greatly limits the utility of making any more, though I don't think—I mean that is a subsequent limitation. The key point I would make is we already have adequate quantities.

Beyond these specific somewhat technical issues bearing on the proposed 155 binary projectile, I believe that the underlying assumptions of the administration's chemical weapons program are highly questionable. I believe they are based on wholly inadequate analyses of the characteristics of chemical weapons. I believe that this lack of adequate analysis and coherent planning seriously risks disastrous consequences to the United States and its allies should we become involved in chemical war.

CURRENT CHEMICAL WEAPON STOCKS SATISFACTORY

Let me explain very briefly why I come to the conclusion we have enough chemical artillery shells at present. The objective of using chemical artillery, according to present doctrine, is not essentially to get casualties. The reason is, if you put men in modern protective equipment they are invulnerable to modern chemical weapons, for all intents and purposes.

Highly controversial and very important, but the tempo of their operation can be slowed. The object is to put gas on to the point their commanders command them to put on their protective equipment. You can calculate how much is needed for that purpose in various ways. One way is to ask how much more effective is a chemical projectile than a regular high explosive one if men aren't wearing protective equipment. You can average this over ICM's and over regular emissions and men attacking and dug in and so on, different conditions. You come up with a ratio of 10 or 20. That means if people don't put on their protective equipment, and for each let's say 20 or near rounds you shoot, you shoot even 1 chemical round, if they don't put on their equipment, they are, in effect, granting to your side a 50 percent or even 100 percent increase in your artillery power against them, which is something that it would be unreasonable for any enemy commander to grant to our side. Therefore, something like 5 percent of our total fire is certainly adequate. And I have heard Chemical Corps officers say less would be enough recently. They may not say that in public, but I have heard them say it in technical discussions in which I have been involved.

At that figure we can calculate how many we need. In 30 days in Europe, U.S. forces might shoot for four or five artillery shells. That means we might need a couple hundred thousand, 250,000 chemical artillery shells if we want to meet that 5-percent requirement. It has been estimated from unclassified sources to be more than that.

We shouldn't forget that the United States maintains a large number of 155mm mustard rounds, and it is wrong to think of these as obsolete. Nor does the Army do so, because the current Army plan for maintenance of munitions, which I have here, an unclassified plan, projects the bringing up to ready-to-issue status of our 155 and 105 caliber mustard rounds. Mustards, indeed, would be superior in the role of forcing enemy personnel into a protective posture under certain im-

portant conditions. So that I would say that the requirements that one can justify rationally are more than met in present stocks.

WEAPON DETERIORATION

As to the problem of deterioration, I think Senator Garn, as I mentioned earlier, has made extremely well the point the leakage problem is sheer politics. But beyond that it is not the question of leakage but whether the agent is deteriorating and getting to be ineffective.

There was a surveillance done on each lot of nerve gas and mustard we have. There are four code categories. A means serviceable with no restrictions as to time. B means serviceable with certain restrictions. C means serviceable with other restrictions. H means no good; you have to demilitarize it.

Every single lot of nerve gas, both VX and GB, in 155 and 8-inch, is code category A, not even B or C. Some of the 105's are B and C. But the ones we are talking about here, the heavy ones, the ones that would be presumably added to, supplemented or replaced by binaries are all containing agents in category A. There is no evidence of which I am aware that the existing stockpile of those munitions, if properly maintained, cannot be kept in serviceable condition for many, many years into the future.

Regarding this question of field testing——

Senator GARN. Excuse me. Could I interrupt there and ask one question.

REPLACEMENT WITH BINARY WEAPONS

I am a little bit puzzled because I don't know of anybody who is advocating this in addition to what we have. I don't disagree with anything you have said so far. Sure, there is plenty. I am not advocating we increase the stockpile. I believe that we ought to build binaries as a replacement so that we can totally detoxify all of the present stockpile that we have, not because we can't store it safely, but because when you start to try and transport it—and again I may or may not be talking about classified things; I just don't want to take the chance of going too far. I think you know what I am talking about—the ability to move to a theater, the ability to have a delivery system as a credible deterrent and all of that.

I just want to make it clear, I don't disagree with you. There is far more than enough in our present stockpile. I look at binary as a replacement because of the transportation and delivery problems.

Mr. MESELSON. Yes; I tried to address some comments to that.

I think that regarding our artillery shells that binaries are likely to be inferior to single field in some of those artilleries and certainly not superior enough even given the best of assumptions showing the \$1 or \$2 billion it would take to replace it.

First of all, there is no intention at present to replace that stockpile of artillery stockpiles. The Army plans until 1988 to bring into serviceable condition all of the existing artillery projectiles. Nor would it make any sense to destroy those projectiles. It would cost \$20 to \$30 each to bring them into serviceable condition. It would cost at least \$550 each

for the others. There is no reason at all to spend 10 or 20 times the cost.

DISADVANTAGES OF BINARY WEAPONS

The binary is three or four times bulkier to store. That is not so important because bulk is not the key thing in shipment; weight is. But it is not an advantage when you have to take that much more real estate, especially if it is in Europe where they don't like giving up very much real estate.

Second, it is heavier to ship. The Army, in response to some questions from the Senate a few weeks ago, responded that each binary projectile in 155 would entail 60 pounds of shipping capacity. They later admitted they had done the numbers wrong. That is not something you should have wrong numbers on at this late stage.

Per round it is more weighty. That is not a big factor. The problem is the existing one and the binaries are both awfully heavy to ship. But the binary weighs more.

In the peacetime political problem, the one you were referring to, which we created by exaggerating it wildly—but I presume we have enough sense never to do it again—

Senator GARN. There will always be politicians around to exaggerate the problem. [Laughter.]

Mr. MESELSON. I am lost for words. You derailed my train of thought, Senator.

Senator GARN. I apologize.

Mr. MESELSON. You actually did.

The binaries, unfield-tested, more expensive, bulkier to ship, it seems to me offer no great advantage; and in the political domain, if I could venture a millimeter into it, making them, I think, promises to stir up strong movement in Europe to make us bring home the existing one and only stockpile that we have in Europe, which is in Germany.

As you may know, Chancellor Schmidt's party congress a few days ago, in fact on the anniversary of the first use of gas in World War I, April 22, resolved to ask their Government to have all the stocks that are there taken home. I am not talking about other possible binary modes. I haven't looked into them enough, and in most cases the configuration isn't even well enough determined. But when it comes to artillery shells, it seems there are disadvantages.

What I was going to say when you made that comment, is that the purpose of the binary is to me a peacetime political problem which I hope won't come back as strong, at least as it was once. When the war starts, the binary advantages all go away. You have to assemble them in the field. I know you can assemble them under perfect conditions in 2 minutes each. But what commander wants to have to go through the procedure of opening up the box with the cannisters, taking out the cannister, keeping everything clean, unscrewing the base plate of the projectile, taking out the spacer, putting in the cannister, screwing it back up again, making sure it is tight and won't leak. It is not impossible. Men will gladly do it if commanded to do so. But why add complexity when we have already a very simple, rugged system. So I don't think it has

been looked at carefully enough why we should go into binaries with artillery projectiles.

BINARY WEAPON DEPLOYMENT

Now, the problem of deploying them is complicated by civilian concern regarding civilian casualties. It is the unique characteristic of chemical weapons that you can protect soldiers against them and the soldiers can still fight. If you protect soldiers against high explosives, you have to put them in a hole or behind a lot of metal or concrete and they can't fight very much. To protect soldiers against flames you have the same problem. To protect them against nuclear weapons, you can't. But to protect them against chemical weapons requires chemical clothing and masks, and it can be done. The problem is the civilians.

These represent some calculations Dr. Robinson and I made, but they are typical calculations made by people in this field of the downwind hazard of several very limited chemical attacks superimposed on the map of West Germany. This darkest zone, which corresponds to an area of 45 square kilometers with the most present meteorological conditions in Europe, is the zone where people would exceed 50 milligrams per minute per cubic meter. That is the total of a lethal dosage. People there would either be killed or brought to the brink of death in spasms, uncontrolled breathing, asphyxiation, involuntary—all kinds of medical things I won't go into. This larger area would have severe symptoms but, except for infants and infirm people, a low death rate. In this large area you would have mild symptoms.

Now, you can calculate under different assumptions regarding the distribution of attacks how many square kilometers would be made lethal at this high concentration of 50, and it depends on the exact pattern of the distribution. According to my calculations, the answer under the standards, so-called D-meteorological conditions in Europe, comes out to be somewhere between 2 and 20 square kilometers would be made lethal for each ton of nerve agent you use.

CHEMICAL USE IN EUROPE

The amount of chemicals we might use in Europe—I think there are some additional charts here—is subject to serious discussion and debate. The highest figure I have seen is the figure attributed to the Joint Chiefs in Senate testimony last year of 19,000 agent tonnage in stockpile required for Europe. What fraction of that 19,000 tons you might put into artillery projectiles is a question I want to touch on in a minute.

If we take a number like 19,000 tons, that would correspond to between 40,000 and 400,000 square kilometers becoming lethal if that were used. Now, within that 40,000 to 400,000 square kilometers, one of three things has to happen about the people there. They could be protected. They could be given gas masks and doctrine for using them and collective shelters and so on. This is a massive undertaking. It would require discipline. It would require provisions for all kinds of people, infants, the infirm, and so on. It is physically, in principle, impossible.

The second thing that could happen is to move them out. That also is a massive undertaking because you are talking about, if you have a population density—if you remove the major cities from Europe, from the population map of Europe, on the assumption that gas would not be used there by armed forces, and then recalculate the population density, you get something like 100 people per square kilometer. That means we are talking between 4 million and 40 million deaths or exposures to lethal conditions. To move anything like that many people in the course of battle would be a gigantic undertaking.

The third possibility is they stay there without protection. This is a massive problem, and I presume this is why the Europeans are very reluctant to have a doctrine of heavy chemical retaliation brought into NATO planning.

ARTILLERY PROJECTILES

Now, as to artillery projectiles, with this requirement, if we were to put, say, half of it into artillery projectiles, which historically is not an unreasonable practice, we could calculate how many million pounds that would be in an average of 10 pounds per round to get this 10,000, which is to me the most reasonable projection, of 2 million. That would be enough firing in 5 percent of all of our fire for 270 days of continual chemical warfare in Europe, 10-plus divisions, 1,500 guns.

If we were to share our chemical munitions with all of NATO—and there is not much indication that all of NATO or even much of it would agree to use them—but if we should, since we cover about a third of the total NATO front and have about a third of all the canon, it would be enough for 90 days of chemical warfare with everybody shooting chemicals at 5 percent without interruption from start to end.

So I must say that, in my opinion, this enormous stockpile has no justification whatever. I would see no justification for such a big stockpile, unless one is planning on a very long war and a war in which all of our allies are simultaneously using our chemical munitions, something for which, as far as I know, there is no agreement whatsoever on their part. So I must say I see no reason either to replace our existing stockpile with binaries, nor am I aware of any plans to do so actually, only to add on the binaries; nor do I see any reason for adding additional numbers.

There are some other points I wanted to touch on, including the problem of airlifting these materials to Europe. I think because of the lateness of the time and in order that my colleague be able to say a few words, I should at this point stop.

Chairman HATFIELD. Thank you very much, Dr. Meselson.

[The statement follows:]

PREPARED STATEMENT OF DR. MATTHEW MESELSON
PROFESSOR OF BIOCHEMISTRY
HARVARD UNIVERSITY

It is indeed a privilege to appear before this Committee. I have served as a consultant on chemical warfare matters to a number of administrations, including the present one, and I welcome this opportunity to appear today in connection with your consideration of the Administration's request for funds for production of certain binary nerve gas weapons.

I agree with this and previous Administrations on the necessity of assuming the existence of a substantial Soviet chemical threat. We should deplore, however, the practice of putting forth to the Congress and the public worst-case interpretations for which the evidence is highly questionable or misrepresented. The departure from high standards of evidence and interpretation which is frequent in this field can, over time, only harm US interests. The fact is that we do not know whether the Soviets have or have not significantly added to their stockpile of lethal chemical munitions during the 12 years since we last produced such weapons. Similarly, estimates of the size and composition of Soviet chemical stocks are extremely variable and uncertain. Indeed, we do not know whether the Soviet stockpile of chemical weapons is larger or smaller than that of the US. It is prudence, not definite knowledge, which requires that we assume the existence of a substantial Soviet chemical weapons capability.

I also agree with the determination of this Administration and its predecessor that increased effort should be given to equipping and training US forces to protect themselves against chemical weapons.

It is a unique attribute of chemical weapons, in contrast to conventional weapons, that it is possible and practical to provide military personnel with a high degree of protection. A soldier wearing modern protective clothing is nearly invulnerable to chemical weapons at practical field concentrations. Against a soldier wearing modern protective equipment, chemicals are far less effective in producing casualties than are conventional weapons. Thus, a good defense accomplishes two important objectives. First, it greatly reduces the incentive an adversary may see in attacking with chemicals. Second, if this disincentive fails, a good defense greatly reduces the effect of a chemical attack. We already have effective equipment for chemical defense but important improvements are possible. With continued support and good management,

they will be forthcoming. The other key element in chemical defense is good training. More time is spent on training programs than in earlier years but I believe the prevailing evaluation is correct that both the practice of chemical protection and the concepts underlying it could be considerably improved.

Where I begin to disagree seriously with the plans of the current Administration is in its program for major outlays for a new generation of nerve gas weapons.

For Fiscal Year 1983, the Administration has requested funds for production of two new chemical weapons: the M687 GB 155mm binary nerve gas artillery projectile and the Bigeye binary VX nerve gas bomb. It is only the artillery projectile, however, which is certified as ready for production. As for the Bigeye bomb, its developer, the Navy, now states that the need for further development and testing will postpone the first possible production to FY84 or beyond. In view of the fact that budgetary authority is at an especially high premium for FY83 and in view of serious doubts regarding the deliverability and the effectiveness of Bigeye, it would seem wise to defer consideration of the authorization of production funds for the Bigeye to next year when the as yet incomplete DoD studies of its utility are farther along. Therefore, I shall focus this part of my testimony on the issues raised by the request for funds to begin production of the M687 artillery projectile.

I question the need and military utility of additional nerve gas artillery ammunition. US forces already have considerably more than enough nerve gas artillery projectiles for a 30 day full-scale war in Europe, even under the assumption that chemical weapons are in use from the start of hostilities.

Let me explain. For causing casualties to well-trained, well-protected troops, as the Soviets certainly are, chemical artillery fire will generally be much less effective than conventional high explosive artillery fire. By forcing troops into protective posture, however, chemicals will degrade mission performance and slow the tempo of enemy operations to an extent which is uncertain but could be substantial under some conditions.

Since firing more chemical rounds means firing fewer conventional rounds, there will be an optimum ratio, depending upon the amount required to force the other side into protective posture. Firing more chemical rounds than this optimum will reduce, not increase, US combat effectiveness. Thus, as stated in a recent DoD report to the Congress, the objective of US retaliatory use of chemicals would generally not be to obtain casualties but rather to force the

other side into protective posture. Avoiding additional casualties to unprotected civilians downwind is a further reason for not exceeding the optimum.

Calculations based on munitions effectiveness data show that the inclusion of just a few percent chemical rounds in total artillery fire would provide opposing forces with a powerful incentive to assume a high degree of chemical protection. The number of chemical artillery rounds needed to comprise five percent of all rounds fired by the US during 30 days of all-out war in Europe would be about 200,000. Essentially the same estimate can be reached by a different approach, namely, detailed target analysis.

It may be estimated from unclassified sources that the existing stockpile of M121 and M426 nerve gas artillery projectiles is substantially greater than this requirement.

Also, it should not be forgotten that the US maintains a large number of 155mm mustard rounds designated M110, which, for creating a persistent vapor hazard to the lungs, eyes and skin can be superior to rounds containing nerve agents GB and VX. Indeed, the Army is planning to upgrade the M110 stockpile, very substantially increasing the number of ready-to-issue rounds. In addition, there are large stocks of 105mm GB nerve gas artillery projectiles, the M360 and 105mm mustard artillery projectiles, the M60. Although the Army is phasing the 105mm howitzer out of Europe, it will remain a standard artillery system for the Marine Corps. The Army's upgrading program also includes these 105mm nerve gas and mustard munitions.

I would like to emphasize that stocks of serviceable 155mm and 8-inch nerve gas artillery projectiles are not significantly deteriorating. Tests done several years ago were mistakenly interpreted to suggest deterioration of nerve agent in US artillery munitions. The tests were later found to have been done incorrectly. Subsequent tests showed no deterioration. On the basis of still more recent tests, the Army has assigned all lots of nerve agent in its 155mm and 8-inch artillery projectiles to Condition Code A, defined as "Serviceable - fully meets all military characteristics. Issuable without limit or restriction." The same holds true for all lots of mustard gas in M110 155mm projectiles and in M60 105mm projectiles.

As of last summer only 33 of the very large number of stockpiled M121 and M426 projectiles were classified as leakers. The leaks are minuscule. They present no real hazard. In past years some of the stocks were not adequately maintained. Also, burster charges were not available for many of the rounds.

Due to improved bursting and maintenance programs, the stockpile of serviceable chemical artillery munitions will substantially increase over the next

several years. On the basis of all available evidence, it is reasonable to expect that the bulk of the serviceable stockpile of 8-inch and 155mm chemical artillery munitions will, with proper maintenance, remain fully serviceable for many years.

A further point to consider is that the proposed binary projectile has not been adequately field tested. In contrast, the presently stockpiled US nerve gas artillery projectiles have been extensively field tested.

Due to restrictions on field testing enacted by Congress, the M687 binary projectile has never been field tested in its actual configuration. In spite of extensive field tests with simulated agents, and a single test shot with a live round of a binary munition of significantly different design, field testing with live rounds of the M687 has yet to be done.

In addition to revealing possible unsuspected design faults, field testing is needed in order to develop munitions effectiveness tables which presently do not exist for the M687 binary. Only such testing can provide fully dependable information as to whether the M687 is reliable and equal in effectiveness to the currently stockpiled M121 GB round.

In this regard the former Director of Development at the Army Chemical Systems Laboratory, Dr. Saul Hormat^s, has stated that, and I quote, "When I developed and introduced into production the presently stockpiled munitions I chose a straightforward approach and merely adapted and modified the designs of existing suitable munitions for which we had a very large number of static and then dynamic (field) trials. We had to make numerous design changes as these trials progressed and in some cases critically important changes they were. We would never have gone into production without all this engineering data, even on as simple an adaptation program as we could have devised. The proposed binary munitions are not a simple change from other rounds, but are an entirely new design. Their functioning will be entirely different from their predecessors. Engineering data must be obtained on cloud size and shape, rate of formation, yield droplet size distribution persistency, et cetera, et cetera, statically and dynamically and in statistically significant numbers. These must be with live, not simulant rounds. This is a large program. A few tests just will not do." In the same vein, the Army's Simulants/Simulation Advisory Panel in its 1974 report on the 155mm binary GB projectile stated that production without live agent field testing "...severely weakens the deterrent value of the munition and sets the precedent of stockpiling ordnance not fully field tested, and produces unnecessary uncertainty in Army planning."

Lastly, the main limitation of US chemical artillery capabilities is likely to be imposed by deployment difficulties, not by stockpile limitations. No NATO ally has indicated willingness to accept deployment of these munitions. The stated policy of the Federal Republic of Germany is not to train its troops in the use of chemicals "now or in the future." There is no evidence that the FRG will permit replacement of US chemical weapons already deployed there with binaries, let alone permit the deployment of increased quantities.

Indeed, there are recent indications that US production of short-range nerve gas weapons such as the M687 which are perceived as being most likely to be used on German soil could force the Government of the Federal Republic to request withdrawal of US stocks presently positioned on its territory. Less than two weeks ago, at its annual conference, Chancellor Schmidt's Party overwhelmingly passed a resolution requesting the Federal German Government to have removed from its soil all stocks of poison gas and to renounce any such deployment in future. This would leave the United States with no stocks whatever in Europe for prompt retaliation in case of chemical attack. Recently the Norwegian government precluded such deployment. So has the Dutch Government, which has also renounced all use of chemical weapons.

Much of the opposition to chemical weapons in European NATO countries is based on awareness that even a few weeks of major chemical war on their territory could cause tens of millions of civilian casualties, a catastrophe of strategic proportions for Western Europe.

In view of the lack of any substantial prospect of pre-positioning, it becomes important to consider the logistic problem of rapid deployment by airlift. In unclassified testimony to the Senate last year, the Joint Chiefs were represented as recommending a requirement of approximately 19,000 agent tons of chemical weapons for possible use in Europe. If we consider half or even a quarter of this to be in the form of ground-fired munitions such as 8-inch and 155mm artillery, the problem of airlift deployment is seen to be acute, requiring a large proportion of the total C141B airlift capability over a one-month period. This may be seen in the following table:

MINIMUM REQUIREMENTS FOR AIRLIFT OF CHEMICAL ARTILLERY MUNITIONS TO EUROPE

<u>agent tons (thousands)</u>	<u>artillery projectiles (millions)</u>	<u>C-141B** flights</u>	<u>Weeks using*** entire fleet</u>
5	1	2100	2
10	2	4200	4
15	3	6300	6

* At 10 agent-lb/projectile, averaged for 8-inch and 155mm.

** At 150 lb/projectile, averaged for 8-inch and 155mm, including all projectile components. Aircraft loaded to maximum payload of 36 tons. Dover, Delaware, to Ramstein, West Germany.

*** At 1.5 days/sortie, 230 operational aircraft.

Note: The above estimates are minimal and would be somewhat greater for binaries or for less than maximum allowable aircraft loading.

Thus, even if one subscribes (as I do not) to the JCS view that currently serviceable US chemical artillery stocks are quantitatively inadequate, building additional supplies may do little or nothing to make such supplies available in the theatre.

The dollar cost of the artillery segment of the binary program will of course depend on the numbers and kinds of munitions to be procured. A current estimate of the cost of the M687 binary artillery projectile is \$550 per round. The other binary artillery projectile now being developed, the 8-inch IVA (intermediate volatility agent) round might cost about 50 percent more, in 1982 dollars. In the same testimony to which I referred above, and on other occasions, it has been indicated that the total world-wide JCS requirement is a stockpile of 25-30,000 agent tons. If 5, 10, or 15 thousand agent tons of this total were to comprise 155mm and 8-inch binary artillery munitions in equal numbers, the estimated costs would be as follows.

COST OF BINARY ARTILLERY MUNITIONS

<u>agent tons (thousands)</u>	<u>artillery projectile (millions)</u>	<u>cost (billions-1982 \$)</u>
5	1	0.7
10	2	1.4
15	3	2.1

(The above estimates are exclusive of the other currently envisaged binary nerve gas weapons: the Bigeye bomb, the Multiple-launch chemical rocket system, the chemical cruise missile and the chemical corps support missile. These weapons would cost considerably more than artillery munitions on an agent ton basis.)

In summary, I conclude that there is no significant need for binary artillery projectiles and that their production would, over the period of several years, waste several hundred million dollars without adding significantly to our defense capabilities.

STATEMENT OF JULIAN PERRY ROBINSON

EUROPEAN DIMENSION TO BINARY PROGRAM

Chairman HATFIELD. Dr. Robinson, if you could move those microphones over.

Mr. ROBINSON. Mr. Chairman, as a European, it is a special privilege to appear before you and your committee. I am very much honored by your invitation.

There is, as you know, a strong European dimension to the binary program. Many of us in Europe are concerned lest this dimension be ignored or belittled in the decisions that lie ahead for the Congress.

My understanding is that you want to know from me more about our European view of the binary program.

Chairman HATFIELD. Your entire statement will be placed as part of the record, but if you would comment more specifically on that point, it would be very helpful.

[The statement follows:]

PREPARED STATEMENT OF JULIAN PERRY ROBINSON

Mr. Chairman:

It is a privilege to be invited to appear before this Committee, and a special privilege for a European.

US moves to renew production of chemical-warfare (CW) weapons these past few years have stimulated no little debate in Europe. Much of it, however, has taken place within fora which are private or which, for other reasons may not have received American notice. My aim in this statement is to describe some of its principal strands. I cannot, of course, pretend to portray the debate in its entirety, still less to offer a view that is typical of the 315 million NATO Europeans. My outlook is that of a professional research worker who has been studying chemical-warfare matters for some 15 years now, mostly within the European academic community.

I start with a summary of the immediate practical implications perceived in Europe of President Reagan's decision to order binary munitions into production. I then recount some of the peculiar sensitivities in Europe towards the program, with mention of reactions that have already occurred there. I go on to identify the different costs and benefits of the binary program that have received attention in the NATO-European debate. I close with some personal views of my own where this all takes us.

PRACTICAL IMPLICATIONS FOR EUROPE OF THE CERTIFICATION DECISION

By certifying to the Congress that "production of lethal binary chemical munitions is essential to the national interest" of the United States, President Reagan has removed the doubts there had previously been in Europe as to the seriousness with which the United States was pursuing the binary program. The explanatory memorandum issued by the White House that same day 1/ and widely disseminated abroad as an Official Text by the US International Communication Agency has been studied closely in Europe. We have read in it that the purpose of the resumption of production is to ensure that "the US has a credible and effective deterrent/retaliatory capability". We have also read that "no decisions or recommendations have been made regarding deployment of chemical weapons"; and that "should it ever be determined that overseas deployment is desirable, there will be full consultation with the nations involved prior to making any decisions".

We have noted the implication that the existing deterrent/retaliatory capability has been judged inadequate. We have not been told in any detail what the criteria are on which that judgement was made, and we assume, therefore, that they are properly kept secret. But probably all Europeans who have thought about it doubt whether the capability could ever become any more "credible and effective" without the new weapons being deployed to their potential theaters of use. This is because we see the working of in-kind poison-gas deterrence as requiring the adversary to perceive that the retaliation will be quick in coming and can be directed against targets of a particular vulnerability that may be short lived: vulnerability either to the destructive effects of the retaliatory weapons or to the degradative effects on mission performance of the antichemical protective countermeasures that the retaliation will call forth. Therefore, despite the current disjunction of the production and deployment decisions, it is a very common view in Europe the production of the new binary munitions will inevitably be accompanied sooner or later by their deployment overseas. Above all, we find it hard to believe that the Congress would finance the program without itself also assuming eventual forward deployment.

For the way it seems in Europe the binary program is going to consume a lot of the US taxpayers' money. We have read from published hearings of the Senate Armed Services Committee that the Joint Chiefs have an overall requirement for 25,000 - 30,000 tons of chemical agent in the form of binary munitions.^{2/} We learn from (a) the current estimates of the unit costs of the two binary munitions that are nearest to production and (b) the weights of toxic agent that these munitions are capable of disseminating that binaries will cost around a quarter or a half million dollars per agent ton.^{3/} The total JCS requirement thus seems to imply a total production cost in the range of \$6-15 billion in 1982 dollars. An expenditure of such magnitude is impressive to Europeans, enhancing

our expectation of binary pre-positioning should the Congress vote to initiate the program.

We have read, further, that the Joint Chiefs estimate that 19,000 agent tons of their total binary requirement is what they need for Europe. 2/ If a quarter of that were in the form of Bigeye or comparable air munitions and three quarters in the form of M687 artillery rounds or comparable ground munitions, the 19,000 agent tons would amount to about 300,000 tons of binary ammunition. To store so large a quantity in Europe would require that facilities for at least 30 new ammunition supply points (of the capacity currently typical of the US Army ASPs in West Germany⁴) be made available by European governments. Quite apart from anything else, that is a lot of real estate. 5/

If, however, we really are to believe that a logic exists for procuring the new weapons without pre-positioning them, and at the same time to believe that 19,000 agent tons are what it takes to counter or deter Soviet chemical warfare in Europe, the practical implications for us take on a different, and more disturbing, quality. For the presumption would then have to be that that quantity would be moved into Europe as soon as consumption of the stocks already there had begun in retaliatory operations. For the ground munitions alone that would require dedication solely to chemical-weapons supply of almost the entire current US C141 airlift capacity for a period of some six weeks. The question which would then confront Europeans would be how long the NATO conventional defence could be expected to hold, deprived of a major part of its reinforcement and resupply capacity. Early resort to nuclear weapons might become unavoidable.

EUROPEAN SENSITIVITIES

That eventuality would be one which we, no less than our American allies, would do our utmost to avoid. But if that meant accepting the new binary munitions onto European soil during peacetime, then another stratum of European sensitivities would be exposed and find political expression. These sensitivities reside in several factors:

1. The peculiar horror with which poison gas warfare is viewed in Europe. A great many veterans of World War I have for decades served as continual reminders of chemical warfare, through chronic disabilities attributed to gas poisoning. Moreover, in the opinion of many military analysts, two-sided resort to chemical warfare would have the effect of slowing the tempo of operations towards the point where attrition became the only practicable combat means: a reversion to the meat grinding tactics of 1915-18 whose imprint has gone deep into the European consciousness.

2. The highly delicate political accommodations which have been reached or are still being sought concerning Pershing-II and cruise missile deployment. American pressure for forward-deployment of binaries as well would stimulate publicists to draw parallels between poison gas and the neutron bomb. Given the current strength of the European nuclear disarmament movement, yet more problems would then be created for European governments directly involved in NATO's current nuclear force modernization program.

3. The fragile nature of the consensus which is continuing to grow on the necessity of upgrading NATO's conventional forces and the increase in defense expenditure that this requires. The consensus could become jeopardized by moves to divert material resources and political capital towards chemical warfare forces.

4. Because of the enormous potential of poison gas for inflicting collateral damage (which computer simulations suggest could, in terms of the ratio of non-combatant to combatant casualties, actually exceed that of battlefield nuclear weapons) there exists a much stronger tendency in Europe than in America to regard poison gas as a quasi nuclear weapon. Heavy forward deployments of chemical munitions could appear or be portrayed as an American attempt to "conventionalize" poison gas. This in turn may activate concerns about the decoupling of US nuclear forces from the NATO defense.

That these and other such factors to some extent conflict with one another is true; but this does not diminish overall European sensitivity to chemical-weapons issues. Indeed, it probably makes alliance consensus on a NATO chemical-weapons policy and on the posture that that policy requires still harder to reach. As the appended table--Positions of NATO Nations Regarding Chemical Warfare--indicates, there is currently a wide divergence of national CW policies and postures within NATO.

Even at this early stage the US binary program has already elicited countervailing responses from some European governments and political parties. Within a week of President Reagan's certification, the Dutch Government had publicly espoused a new policy forswearing use of chemical weapons by Dutch armed forces and storage of chemical weapons in the Netherlands. 6/ On the basing of chemical weapons within its territory, the Norwegian Government endorsed an analogous policy that had been declared by its predecessor in 1980. 7/ Two weeks ago, Chancellor Schmidt's party in West Germany adopted a resolution at its annual convention which "requests the Federal Government that all stockpiles of poison gas in the Federal Republic be removed and that no permission for future deployment of such warfare agents as a contribution to a mutual withdrawal of such weapons from Europe" 8/ In Britain there is a Private Members Bill before Parliament which seeks to make storage of chemical weapons in Britain illegal: 9/ a bill which has no chance of becoming law, but which reflects growing apprehensions in Britain that the country is soon to become an American chemical-weapons repository. Last December, after stating that the British Government had received no request to this effect from the United States, the Defense Secretary amplified his statement by saying that no such request was anticipated. 10/ This, in its context, notably forthright position has since been endorsed by the Government in Parliament. 11/ Also on the public record is the British Defence Ministry's repudiation of press reports that it had been discussing coproduction of binary munitions with the US Defense Department. 12/

However, just as some prominent European political figures have expressed opposition publicly to an upgrading of NATO's CW retaliatory capability, so also have others expressed support for it, albeit much less conspicuously. Nor are they without supporters within the European defense Community. No European government has yet taken such a stance; and the US Administration, in contrast to the Congress, 13/ has clearly been doing its best not to occasion any necessity for public policy choice by European governments. It is, of course, the possible ineluctability of such choice which has stimulated the European debate to its present level.

It is recognised in the debate that benefits to Europe could result from the US binary program. They are seen to require close attention, as indeed they are receiving, though for the most part behind closed doors. The debate turns on whether the benefits are or are not likely to outweigh their attendant costs.

BENEFITS DERIVABLE FROM THE BINARY PROGRAM

The White House memorandum directed attention to two special benefits available from the binary program. Upgrading the retaliatory capability would improve deterrence of what was portrayed as a grave Soviet poison-gas threat. And it would "provide incentive and gain leverage in arms control negotiations" on poison gas. The memorandum suggested that the only present interest the USSR has in such negotiations is to impede improvement of US deterrent capabilities.

Alarming portrayals of the magnitude and menace of the Soviet poison-gas capability are common in Europe. Yet on close inquiry it seems that Western Intelligence in fact has no clear information about its precise nature or extent. There appears to be no solid basis for believing in, for instance, a Pact-NATO poison-gas gap. That there is a Soviet poison-gas capability is not, however, seriously doubted; and in the absence of hard intelligence it is seen as only prudently accord it substantial military significance. NATO therefore needs countermeasures. It has them already, but the question as to whether they are adequate is wide open.

Let me remind you of the nature of those countermeasures. NATO's posture for chemical warfare comprises widely deployed antigas protective equipments for military units and indoctrination in their use, both of which are increasing in quantity and quality as a result of decisions taken by NATO during the 1970s (e.g. in the agreements on STANAG 2352, NBC Defense Equipment Operational Guidelines; the CW defense provisions of the NATO Long Term Defense Plan; and the establishment of a permanent NBC working group within the Euro-NATO Training Group). There is a prominent school of thought among chemical-warfare analysts in Europe which believes that actual deterrence can be engendered by a strong antigas protective stance, the reckoning being that good protection can raise the intensity of the CW attack needed to overcome it to a level that is uneconomical, and therefore militarily unattractive, in comparison with other forms of attack. The NATO posture also comprises stocks of retaliatory CW weapons maintained in Europe by France and the United States. The American supply, at a single location in West Germany, said to be near Pirmasens, is thought to be sufficient to keep front-line Warsaw Pact forces in full antigas protective

posture for 1-2 weeks, and there is at least five times that quantity of serviceable chemical munitions, including long-range varieties (aircraft bombs and spraytanks), held in the United States in readiness for rapid deployment to Europe. The enforcement of antigas protection, and hence the degradation of combat efficiency that must inevitable result, is a second possible motor of poison-gas deterrence. The NATO chemical-warfare posture is, of course, also embedded within the current strategic concept of flexible response, so that the possibility of nuclear retaliation must enter into any Warsaw Pact decision-making on resort to poison-gas.

It is argued by some European analysts that as much deterrence of Soviet CW as it is possible to achieve is already provided by this triad of counter-measures.^{16/} If so, an increase in the NATO retaliatory capability would not necessarily increase the deterrence. Indeed, by suggesting diminished resolve to use nuclear weapons, or by diverting resources away from antichemical protective preparations, it could so weaken the other two legs of the triad as to have precisely the opposite effect.

We in Europe have heard the present US Administration stating that such reasoning is invalid.^{17/} By and large, Europeans are predisposed, for the reasons stated above, not to accept this position, for it would be to concede the primacy of in-kind retaliatory capability as CW preventive. European attention has thus become focussed on the detailed nature of the improvements which the United States plans for the retaliatory capability.

We hear the improvement being called "modernization" by Washington. Given that even the youngest of the American CW weapons are now more than a decade old, and that the oldest apparently date back at least to 1952, modernization seems to make sense. We understand that many of the stockpiled munitions have deteriorated in storage or been cannibalized for parts needed elsewhere, while others have become obsolete because their delivery systems have been phased out of US service. In Defense Secretary Weinberger's latest Annual Report we read about "over 630,000 unserviceable unrepairable munitions that have been identified for immediate demilitarization".^{18/} And we know that there are, in addition, large numbers of still serviceable munitions for delivery systems whose population in US service is now rapidly declining due to obsolescence. However, we are also told that the total stockpile contains as many as 3.5 million rounds, from which the supply of fully serviceable munitions for widely deployed weapons would therefore still appear to be substantial, becoming more so in consequence of a refurbishment programme for which \$35M have been appropriated since 1978. We are told of an estimate that, as of the mid-1980s, this quantity of immediately usable poison gas will amount to about 7000 agent tons.^{19/} If that were all in the form of ammunition for medium and heavy howitzers (as much of it is), we can calculate that the supply would be enough to keep the entire US deployment of these weapons in Europe - some 1600 artillery pieces - firing poison gas at a rate of 5 per cent of total fire continuously for about 8 months.

That 5 percent scaling is widely considered ample for keeping Warsaw Pact first-echelon units in full anti-chemical protective posture. Yet large though this present capability seems to us, we gather that it is considered insufficient for deterrent or retaliatory purposes by the Joint Chiefs of Staff, who, as noted earlier, estimate the poison-gas requirement for Europe to be 19,000 agent tons. Are we to conclude, then, that the JCS requirement relates not only to U.S. forces in Europe but also to other NATO forces there? If so, the program would appear to be considerably more than 'modernization.' A major part would then seem to comprise an equipment program for European armed forces.

Over and above the 7000 agent tons of serviceably weaponized poison gas, we are told that the United States also possesses at least twice that tonnage in bulk stocks. Most of this additional supply is as potent now, apparently, as it was when originally manufactured. The original purposes of keeping so much poison-gas in unweaponized form was to be able to upload new munitions. Although weaponization of the bulk stocks would seem to be capable of satisfying the Joint Chiefs' requirement, at least for Europe, we gather that there are no plans for doing so. It seems that the bulk stocks are to be abandoned.

We assume that the reason for this apparent extravagance lies in the Joint Chiefs' preference for a retaliatory stockpile consisting entirely of binary munitions. The binary feature would make the munitions safer to store, move about and use. In this we can see not only logistical benefit but also the possibility of operational benefit, for it would presumably make field commanders, whether American or European, less disinclined to take chemical munitions into forward deployment, even into their basic tactical loads. To this extent binary technology could enhance whatever deterrence such closer integration may provide.

Yet we also see countervailing penalties. The first two binary munitions off the production line will generate poison gases of types already massively available in the stockpile - the nerve gases sarin (GB) and VX - but they will do so less effectively than the existing munitions. Part of their payload will be wasted because the binary

reaction will never be 100% complete and because it will generate byproducts and/or side-products. To achieve the same target effects as, say 20 of the present 155-mm sarin howitzer-projectiles, it seems that about 30 of the new 155-mm binary rounds would have to be fired.^{20/} Because of the greater size of the binary rounds, and because they would be supplied to forward units with, at most, only one of the two chemical canisters already inserted, the other(s) being moved up separately, they will occupy more than three times the space of the same number of the current rounds in the supply channel.^{21/} A still greater liability, perhaps, is the fact that the new munitions will, according to present plans, be going into production without prior full-scale field trials, United States law forbidding open-air field-testing of poison-gas weapons. Trials using poison-gas simulants have been relied upon instead for the preparation of firing tables, estimates of requirements, etc. There can be no guarantee that the simulants have in fact enabled simulation of all the factors important to overall effectiveness, not least the propensity to "flash", which is unamenable to simulation. It is conceivable, however, that the French Government, which has no restrictive legislation on field-testing to contend with, may be induced to conduct trials for the United States. France is apparently developing its own binary technology; and the two countries have a recent history of poison-gas collaboration. Rumors that collaborative field-testing of US binaries is planned have been exciting concern within President Mitterand's political party. Be that as it may, a further category of possible benefit has attracted notice within the European debate. Open Defense Department sources indicate that less than a quarter of the weaponized poison-gas stockpile is in munitions for weapons having a range longer than that of current field artillery, and that the only part of this portion currently deployed outside the United States is in Johnston Island in mid-Pacific. If the most lucrative targets for retaliatory CW attack are, as some US chemical-warfare analysts believe, second-echelon and rear-area units, an improvement that allowed the mix of available poison-gas munitions to be weighted more heavily towards longer range weapons could be a significant asset. However, we see that it is an artillery projectile, not an aircraft munition or missile warhead, that is leading the binary program, and there seem to be technical reasons for doubting whether the leading longer-range munition, Bigeye, can be judged an effective weapon.^{22/} By the end of the 1980s binary warheads for guided missiles in the medium- and intermediate-range categories (Pershing II and GLCM) may be available for quantity production; but that is a good way into the future.

With regard to the other main asset postulated by the White House for the US binary program—its benefit as lever on the Soviets in CW arms-control negotiation—Europeans currently see grounds for the strongest scepticism. It is true that the US Administration has repeatedly and publicly reaffirmed its commitment to the objective of banning chemical weapons effectively. President Reagan's letter of certification did so; Defense Secretary Weinberger's latest Annual Report does so; so did the Chairman of the Joint Chiefs of Staff's last Statement on Military Posture; and so did the opening US statement at the start of the 1982 session of the Committee on Disarmament, and the major speech made there by Ambassador Fields on the 25th of March. It is true also, that the Soviet negotiators at the Committee on Disarmament have appeared to have been operating under unaccommodatingly rigid instructions. Yet what has in fact been happening is that the US Government under President Reagan's administration, far from expediting the negotiations as its declaratory policy suggests, actually appears to have been blocking them. Witness its continuing decision not to resume the private bilateral negotiations on chemical warfare with the USSR that have been in abeyance since July 1980; witness its bizarre vote on UN General Assembly resolutions 36/96A and 36/96B calling for continued CW negotiations— the USA being the only country to abstain on the first and to vote against the second; and witness its sustained opposition to the Ad Hoc Working Group on Chemical Weapons of the Committee on Disarmament being given a proper negotiating mandate. All of this is a source of no small disquiet in Europe.

We see the US Administration in public accusing the USSR of not negotiating seriously; but in private — in fora which the press and general public have limited access to and limited comprehension of — we see it denying the USSR opportunities to negotiate seriously.

COSTS AND OTHER LIABILITIES OF THE BINARY PROGRAM

Matters on which opinions may justifiably differ weight too many of the apparent costs and benefits of the binary program for there to be ready consensus among Europeans on any one overall assessment. Passage of time, allowing further study and debate, may perhaps clarify the issue somewhat; but it may also foreclose certain options for policy. The problem is that the number of professional chemical-warfare analysts to whom people in government or politics can turn for informed opinion is rather small, and most of the opinions on offer are likely to be coloured by institutional or other affiliations. The number of real experts on the subject is essentially zero, as there has been no actual experience of poison-gas warfare between technologically-advanced belligerents for more than sixty years. The basis of theory underlying current appraisals of the utility of chemical weapons is now too far removed from practice to be much more than conjecture.

Given, therefore, that general drifts of sentiment and opinion, not facts or expertise, are going to determine the outcome of the decisions ahead, it may be useful to identify here certain basic differences between the ways European and Americans have tended to treat chemical warfare. Some of these differences have been referred to earlier. Two others seem important.

First, the US Army Chemical Corps, which has triservice responsibilities for American chemical-warfare preparedness, has a history well known to European chemical-defense officials of according greater priority to the offense than to the defense: first, capability for CW attack; second, capability for protecting US forces against the collateral effects of their own weapons; last, capability for protecting against adversary poison gas. This was a source of unease for European authorities when, back in the 1960s, they were moving towards a serious upgrading of NATO's antichemical protective stance. In contrast to, for example, the British and West German militaries, the American military may, it therefore seems, be subject to an institutional bias tending towards a much lower opinion of the efficacy of antigas protection. European officials see actual deterrence in a good protective posture. American officials see no such deterrence. Maybe this difference will ultimately disappear, once the current US programme for upgrading antigas protectedness comes to fruition. The main practical effect of the difference has been to sensitize European concern lest a major move back into chemical-weapons acquisition by the US Army brings with it a reassertion of the old priorities, and with that a weakening of one leg of the CW deterrence triad.

The second transatlantic difference shows up over a longer historical time span. When Britain and Germany last rearmed themselves with poison gas, pre-existing national policies of no-first-use continued to find expression in the guidance and orders issued by the military commands. So it does for France today. But for America, poison-gas rearmament on both previous occasions brought a secret abandonment of the no-first-use policy. Papers of the Joint Chiefs of Staff that are now open to public inspection show that the Eisenhower Administration judged such a policy reversal to be the only way of bringing about a speedy integration of the new nerve-gas capability into overall US military posture. Institutional indifference towards a weapon whose use might never be authorized was seen by the Joint Chiefs to be responsible for the failure of the nerve gas programme to keep up to schedule.²³ Close integration of retaliatory capability is a prerequisite of whatever in-kind deterrence that capability can confer, for the less the weapons are assimilated into doctrine and forces, the less credible will be the retaliation and the less immediate its threat. President Nixon ultimately reimposed the no-first policy, just as President Roosevelt had done 26 years before, and President Ford later acted to perpetuate it by ratifying the 1925 Geneva Protocol. With how much confidence may Europeans expect the policy to survive American poison-gas rearmament the third time around?

Even to raise this last question is to cast a grave aspersion upon the United States, which prides itself on its respect for international law. Yet in Europe we hear the voices of not a few Americans claiming that the Yellow Rain and associated reports from Southeast Asia and Afghanistan already provide sufficient reason for rewriting the national policy, even repudiating the 1972 Biological and Toxin Weapons Convention and treating the Geneva Protocol as a dead letter. The strength of the belief now prevailing in Washington that the Russians have indeed been violating these two treaties is not, for the present, easy for Europeans to comprehend. Thus the main practical effect of this second transatlantic difference has been to stimulate European fears that the binary program may inevitably, through institutional mechanisms, weaken the existing chemical and biological arms-control regime, accelerating the erosion already threatened by the reports of Soviet noncompliance with it. Having invested some of their security in that regime, Europeans have a real interest in seeing it not only preserved but also extended by the negotiation of further and properly verifiable agreement. On both scores the binary program is disquieting.

If indeed the Soviets have been violating the existing regime, that obviously calls into question the value of trying to extend it. The Yellow Rain allegations, like the earlier Sverdlovsk anthrax ones, undoubtedly raise questions about the strength or usefulness of the poison-gas and germ-warfare prohibitions contained in international law. Yet there is an historical perspective to the toxics-use reports which should not be ignored.

For what may now be termed the "Yellow Rain" mode of chemical warfare - "Orange Rain" might be a more fitting label - is in fact the historically dominant one, in contrast to such other modes as might be more practicable in a European war. All of the authentic episodes of chemical warfare this century have started from initial use against unprotected forces; and, since World War I, against

technologically far inferior forces. Where there is no antigas protection, poison gas can display its full range of military utilities, the most characteristic of which have been its potential for demoralizing combatants in remote or otherwise inaccessible areas and terrorizing or coercing noncombatants. Presumably with this in mind, my own country used to keep stocks of poison-gas weapons around the world in outposts of empire: in Kenya, India, Singapore, to name a few such places. It even took poison gas along on its last excursion into Afghanistan. So far as I know none of these stocks were ever used; but their deployment is testimony to the length of the Orange Rain pedigree. To say this is in no way to condone the Yellow Rain reports or to suggest that they are not a matter for concern in the Western world. They are; and, if true, must be condemned with all possible vigour. It is a matter for regret in Europe that the binary program is now compromising US diplomatic and related efforts to this end. But there are two matters which this furor should not obscure. First, Yellow Rain capabilities have no part to play at all in the types of warfare that might be practised in Europe. Second, no student of the history of CW could reasonably affect surprise if chemical weapons that were initially justified as an intra-war deterrent in East-West conflict were in fact to end up as war-fighting armament in North-South conflict: the equipment, perhaps, of some Rapid Deployment Force.

The foregoing considerations display some of the costs, penalties and other liabilities which have surfaced in the European debate on the binary program. There are several more, some related, others originating elsewhere. I shall simply list them, including for completeness those already referred to:

1. Foreclosure of a protection-emphasis CW policy for NATO. Assuming existing US and French retaliatory stocks are maintained, such a policy could be perceived by adversaries as less threatening and no less deterring than a retaliation-emphasis policy.
2. The possibility of initiating such political reaction in West Germany that the retaliatory stocks already prepositioned there have to be withdrawn. The SPD conference resolution adopted on 22nd of April (quoted above) indicates that this may be a real possibility. Moreover, nine days previously a prominent figure in the DGB--the Federation of Trades Union--had announced his intention of testing in the German courts, with full Union backing, the constitutionality of the American storage of chemical munitions on Federal soil.
3. Weakening of the general deterrent by suggesting diminished NATO resolve to use nuclear weapons in extremis and, in that eventuality, by complicating the Alliance consultation process.
4. Diversion of resources and political capital away from programs for upgrading other, more important, elements of the NATO defense posture.
5. The penalty of association with an ally who might conceivably be driven to use its newly-acquired chemical weapons in military operations far from Europe.
6. Ceding to the Soviet Union a major propaganda asset.
7. Diminution of international confidence in the existing chemical arms-control regime, and consequent exacerbation of the poison-gas threat to NATO.
8. Setting of a new military fashion for poison-gas weapons, thereby increasing the likelihood of their proliferation. Binary-munitions technology increases accessibility of the weapons.
9. Possible vitiation of attempts to strengthen and extend the existing chemical arms-control regime, as by suitably verified international poison-gas disarmament. This could increase the likelihood of a full-scale race to exploit the many new chemical/biological-warfare possibilities now being opened up by recent advances in the life and molecular sciences and in the biotechnologies.

Whether such costs are real or imaginary, acceptable or unacceptable, are, like the merits and demerits of the benefits discussed earlier, matters of opinion. Except to draw your attention to wider aspects of items 8 and 6, I offer no further comment on here.

Perhaps because Europe has gone through, so to speak, a deproliferation process on chemical weapons, there is a special sensitivity there to the possibility of nerve-gas capabilities spreading beyond the handful of countries that currently possess them. The mechanisms of such proliferation would turn on incentive and on accessibility of the necessary technologies. 24/ A study of the possibilities performed under US Government contract a good while ago by the Midwest Research

Institute, Kansas City, 25/ focused on the matter of technical accessibility, and concluded that several more countries than at present possess militarily significant supplies of nerve gas could speedily acquire them if they chose. In arriving at this conclusion, the MRI team had examined closely the industrial capabilities of various type countries. To suggest to you something of why we, at least in Britain, worry about CW let me remark that the country which MRI judged most capable of producing nerve-gas munitions quickly was Argentina.

It may have been this study which underlay the following testimony given before the House Defense Appropriations Subcommittee on the 9th of June 1975 by Dr. Fred C. Ikle, then heading the US Army Control and Disarmament Agency: "It is my personal view that going ahead with a new production program for chemical weapons would be premature at this time.....Our concern here is that such a program could stimulate third countries to make new efforts in the production of chemical weapons.....The technology is simple and relatively easy to obtain, even for industrially less developed countries."26/

Finally, on the matter of ceded propaganda asset and lost moral advantage, you will be aware that the USSR is in the middle of a campaign to stir up sentiment around the world against the USA by means of chemical/biological warfare stores. This is partly a counterblast to the publicity which the State Department, International Communication Agency and other US organs have been giving to the Yellow Rain evidence. Much of the commentary being broadcast by the Soviets is idiotic; some of it is patent falsehood; but an uncomfortably sizeable part plays directly upon aspects of the binary program that are a source of real disquiet to even the most NATO minded Europeans. Such is, of course, the character of any propaganda efforts aiming to divide allies. This acts as a powerful suppressant on Europeans who might otherwise wish to voice critical comment on the binary program. It is part of the reason why much of the public commentary on the program from official circles in the larger European NATO countries has been confined to generalities and other noncommittal statements vaguely supportive of the US stance.

There is a second and more pernicious reason, too. Any display of NATO disunity on binary program could weaken the arms-control leverage claimed for it by the Administration. For Europeans who are sceptical of the other assets claimed for the program, but see it as inevitable that the program will go ahead, the bargaining-chip potential is all that remains to set against the costs and penalties that the program may incur.

IMPLICATIONS FOR ARMS CONTROL

From the manner in which the chemical weapons arms control negotiations have hitherto been progressing, it seems likely that the West will indeed need leverage to shift the Russians nearer to an acceptable compromise. But it is not obvious that actual production of the new weapons will afford more leverage than that available from what will in any case also be happening: continued research and development of yet more new poison-gas weapons and of production capacity for them -- to say nothing of the immense potential of the West-European chemical industry. Moreover, embarking upon full-scale production will inevitably vest weighty new interests in continuation of production, thereby, in domestic American politics, making consensus on the terms of an acceptable treaty substantially harder to reach.

However, no amount of leverage will work unless negotiations are actually taking place. If the Congress votes to supply the program, it will have a clear obligation in the minds of many NATO Europeans to bring pressure to bear on the Administration to resume the earlier U.S.-Soviet negotiating efforts. The progress made during 1976-1979 was more substantial than is commonly realised. In particular, the Soviets agreed to the principle of using international on-site inspection for verifying poison-gas disarmament -- albeit not to use the technique in the systematic manner for which, in its particular application for verifying stockpile-destruction, the US was pressing.

There is thus a solid bedrock of past agreement on which to build a constructive negotiating strategy for the future. For as long as the US Administration continues to ignore this opportunity, a source of US-European disharmony on CW matters will persist.

POSITIONS OF NATO NATIONS REGARDING CHEMICAL WARFARE

Nation	Is possession of CW weapons prevented by		Legal position on use of CW weapons ^{c/}		Declared policy as it affects basing of US CW weapons
	treaty ?	declared policy ?	Initiatory use	Retaliatory use	
Belgium	No	..	Renounced	Option reserved	..
Canada	No	Yes	Renounced	Option reserved	..
Denmark	No	..	Renounced	Apparently renounced ^{d/}	..
France	No	No	Renounced	Option reserved (and capability maintained)	..
Germany	Yes ^{a/}	Yes	Renounced	Renounced ^{e/}	Permits at present level & location only
Greece	No	..	Renounced	Apparently renounced ^{d/}	..
Iceland	No	..	Renounced	Reprisal only	..
Italy	Yes ^{b/}	..	Renounced	Apparently renounced ^{d/}	..
Luxembourg	No	..	Renounced	Reprisal only	..
Netherlands	No	Yes	Renounced	Option reserved, but renounced under current policy ^{f/}	Disallows
Norway	No	..	Renounced	Reprisal only	Disallows
Portugal	No	..	Renounced	Option reserved	..
Turkey	No	..	Renounced	Reprisal only	..
UK	No	Yes	Renounced	Option reserved	Apparently disallows ^{g/}
USA	No	No	Renounced	Option reserved (and capability maintained)	..

(a) 1954 revised Brussels Treaty. (b) 1947 Treaty of Peace. (c) Position as evidenced, except where indicated, by 1925 Geneva Protocol undertakings and reservations. (d) As a party to the 1969 Vienna Convention on the Law of Treaties (which entered into force in January 1980), this nation is bound by article 60(5) whose import is apparently to exclude suspension of operation of the Geneva Protocol in the event of a breach. (e) And current declared policy states that "the Federal Republic....has made no preparations for using [chemical weapons], does not train military personnel for that purpose, and will abstain from doing so in the future" (White paper 1970, para 68). (f) Current declared national policy precludes any use of CW weapons by Dutch forces (see text). (g) See the statement by the British Defence Secretary in the House of Commons on 23rd February.

NOTES

- 1 "The U.S. program to deter chemical warfare", Feb. 8, 1982.
- 2 Chemical Warfare, hearing before the Senate Armed Services Committee, Sept. 4, 1980, page 41.
- 3 Binary munition:

	Approx weight	1982 unit cost est	Approx weight of nerve agent disseminable
155-mm GB2 arty proj	107 lb	\$650	5.2 lb
500-lb VX2 spraybomb	413 lb	\$30,000	125. lb
- 4 The 33 ASPs currently maintained by the US Army in Germany each hold between 6000 and 10,000 tons of ammunition, according to US Army Armament Materiel Readiness Command testimony to the House Defense Appropriations Subcommittee on May 3, 1980 (see HDA FY80 7:245).
- 5 According to the US Army Corps of Engineers Inventory of Army Military Real Property Outside the United States (Sept. 30, 1980), Dahn Ammunition Depot in Rheinland-Pfalz occupies 978 acres.
- 6 The Netherlands. Tweede Kamer der Staten-Generaal, zitting 1981-1982, Handelingen (2), pages 1877-8, 1891, 1977, 1981-2, 1986, 1989-90, 2030-1 (proceedings of Feb 9-11, 1982).
- 7
- 8 Para 19 of Resolution 1 submitted by the SPD Party Board to the Annual Party to the Annual Party Convention, and adopted by the latter on Apr 22, 1982.
- 9 Foreign Nuclear Chemical and Biological Bases (Prohibition) Bill, submitted by Mr. Tony Benn and 11 cosponsors on Mar 4, 1982.
- 10 As reported by The Times and most other British newspapers on Dec. 30, 1981.
- 11 Hansard (Commons) Mar 23, 1982, col 788.
- 12 The Guardian Nov 1980, page .
- 13 97 Congress, 1st Session, House of Representatives report no. 97-124. (Making Supplemental and further Continuing Appropriations for the Fiscal Year Ending September 30, 1981: Conference Report, June 3, 1981).
- 14 See the testimony of Lt Gen E.T. Tighe, Jr. (Director, Defense Intelligence Agency) and Defense Secretary Harold Brown before the Senate Armed Services Committee on Sept 4, 1980 (see note 2 above).
- 15 See, for example, Colonel A.G. Vicary and Wing Commander J. Wilson, "Nuclear biological and chemical defense", Journal of the Royal United Services Institute (London) Dec 1981, pages 7-12.
- 16 See my paper "Chemical Weapons and Europe" in Survival (London: International Institute for Strategic Studies) 24 (1): 9-18, Jan/Feb 1982.
- 17 The White House, supra note 1; and Caspar C. Weinberger, Report of the Secretary of Defense to the Congress on the FY 1983 Budget &c, pages III-143 to III-148.
- 18 Weinberger, op cit.
- 19 Supra note 2.
- 20 The "Independent Evaluation of Operational Test II (OTII) of the XM687E1 Chemical Projectile" reported by the US Army Field Artillery School, Fort Sill, in October 1976 states that the test data "clearly indicates that the new XM687E1 is approximately 33 percent less effective [in terms of lethality] than the old M121A1 projectile".

- 21 This estimate is derived from the following data on the new binary round (155mm GB2, M687) and the currently stockpiled nonbinary equivalent (155mm GB, M121A1):

	Dimensions of standard pallet (increases)	Number of units per pallet	Average pallet space per unit (cubic inches)
M121A1 projectile	13.5 x 27 x 31	8	1412
M687 projectile	34.0 x 36 x 25	8	3825
M21 OPA canister	40.1 x 52.7 x 39.4	96	868 -4693

- 22 Bigeye was designed during the early 1960s, a time when Soviet air defenses were very different from what they are today. Because Bigeye is a spraybomb, there must be tight altitude and attitude requirements for its delivery if its payload is to end up approximately on target at anything approaching the optimal density for maximum target effects. These requirements may force the delivering aircraft into air space in which it would nowadays be extremely vulnerable to Soviet air defenses. Moreover, the binary reaction it uses, QL/sulphur, goes into a pronounced product-degradation phase as the VX yield builds up, a feature which must limit the time-frame within which Bigeye attacks can be executed.
- 23 See my paper "Chemical arms control and the assimilation of chemical weapons" in *International Journal* (Toronto: Canadian Institute of International Affairs) 36 (3): 515-534, Summer 1981.
- 24 For some discussion, see my paper "The changing status of chemical and biological warfare: recent technical, military and political developments" in *SIPRI Yearbook 1982* (London: Taylor & Francis, 1982).
- 25 Midwest Research Institute, "Verification aspects of a chemical and biological arms control agreement", final report on contract ACDA/ST-150, May 29, 1969 (see vols I and VI); and "Arms control studies in chemical and biological warfare", final report on contract ACDA/ST-182, Dec 30, 1970 (see vols I and II).

26 HDA FY76 9:229.

PRODUCTION VERSUS DEPLOYMENT

Mr. ROBINSON. What I did in my prepared statement, with one of the failings of the academy, was try to review the entire subject, both pro and con, reproducing views with which I personally disagree, and, of course, the statement is much too long to present to you orally. But I submit it in case you are interested for the record.

Chairman HATFIELD. Thank you.

Mr. ROBINSON. Let me then summarize some strands in the debate which seem to me to be particularly relevant to the present concerns.

The administration has said that its decisions on the binary program have so far addressed only the question of production, not deployment; deployment comes later. But in Europe, we can see no logic at all for producing binaries unless they are to be prepositioned in their potential theaters of use. Europe is one of those theaters and, in the eyes of what is the Joint Chiefs of Staff's evaluation, one of the principal theaters.

So many Europeans will see the start of large-scale production as portending inevitably the arrival in Europe of large additional supplies of U.S. chemical weapons or, if not that, then strong pressure from Washington on our governments to accept such supplies in the forward deployment. The logic of chemical warfare deterrence requires this. So does the sheer weight of American resources that may be committed to the program.

The arithmetic which we Europeans can do on the costs of meeting the Joint Chiefs' stages of requirement for binaries suggests a total binary program cost in the region of \$10 billion or \$15 billion 1982 dollars. And we are led to presume from the size of the tonnage requirement that the program is being scaled to equip not only U.S. forces in Europe with binary munitions but also the forces of European and NATO countries.

So the effect in Europe of the binary program has been, and will continue to be, a very much higher profile than before for the chemical warfare issue. And that issue inflames a range of peculiar European sensitivities. These are rooted, we must suppose, in grim memories of poison gas warfare during World War I, and in our awareness that any future repetition would inevitably, as you, Mr. Chairman, said at the beginning, and as has been repeated since then, produce civilian gas casualties on a gigantic scale.

POLITICAL IMPACT ON POLITICS IN EUROPE

The sensitivities are also rooted in our concern that the passions that may be set loose in domestic politics by prosecution of the binary program will undermine, and even in some countries destroy, the delicate political accommodations that have been reached on the upgrading of conventional forces in Europe and the modernization of nuclear forces.

As a means for managing this type of political discord, arms control negotiation has now become the traditional resort. But in Europe we see no manifestation of a U.S. commitment to chemical warfare arms control. We see what looks very much like American duplicity on this score. We see declarations of commitment to chemical arms control by the administration. We hear arms control leverage being claimed for the binary program. But on the ground, in the negotiating forum, we see no U.S. action. We see, instead, the Russians getting a great deal of propaganda mileage out of Washington's continued refusal to resume the bilateral negotiations.

SPEECH BEFORE GENEVA COMMITTEE ON DISARMAMENT

It is true that the U.S. delegation is now more active on chemical warfare in the Geneva Committee on Disarmament. Ambassador Fields there made a major and constructive speech on the subject on March 25. But the Geneva Committee is a multilateral body, 40-odd nations, some with very differing experience and expertise to bring to bear. And it has to be doubted whether a treaty as complicated as a chemical weapons convention would undoubtedly have to be—whether a treaty of such complexity could really be negotiated within that committee without a prior bilateral American-Soviet lead.

A sort of bedrock of progress was built during the bilateral talks initiated by President Ford. As long as Washington continues boycotting those talks and the very significant measure of United States-Soviet agreement which it registered while they were going on, European disquiet about the binary program will go on mounting. But we assume, sooner or later, that Washington will return seriously to the negotiating table.

EFFECT OF BINARY PROGRAM ON SOVIETS

The question then is will the binary program increase or decrease the chances of success. And this, it seems to me, you can argue pretty powerfully either way. It may indeed be the binary program will alarm the Russians, as the administration is suggesting, into a more accommodating negotiating stance. Alternatively, it may tip them right over into a major chemical rearmament program of their own, sort of a start of a full-blown arms race with proliferation and all the rest of it. The latter possibility is one which makes us in Europe extremely nervous.

LEVERAGE BENEFIT OF BINARY PROGRAM

Let me leave arms control. But, Mr. Chairman, if I may draw your attention to one other consequence of the arms control leverage benefit that is claimed to the binary program. If this leverage really exists, it would be most seriously weakened by any display of alliance disunity on the binary program. And for this reason there are many Europeans, particularly officials and government spokesmen, who are greatly inhibited in speaking publicly about binaries. This is one of the reasons for the generally behind-closed-doors and muted character of the present European debate.

One concern that comes to my mind is whether this may not have created a false impression in Washington about the real nature of the depths of European misgivings regarding the program. And some people in Washington may even have derived from this low-key public stance the expectation that given time, Europeans will come around in support of the program. I gather that the administration has been suggesting as much to Congress recently.

As a European, let me merely say that I doubt it. It may not be appreciated here just how constrained many of the European governments, particularly the larger ones, are. Even if they wanted to arm their forces with chemical weapons, or even if they wanted merely to accept American chemical weapons on their territory, there are major constraints acting on them. There are even international treaties which preclude Germany and Italy from possessing chemical weapons. There are public statements of governmental policy in Britain, my country, in Canada, in The Netherlands, and in Norway which rule out one or the other of those two options. In fact, I summarize all of these positions of the European governments in a table in my prepared statement.

Now, it is true that these treaties and national policies can be revised, but that would necessarily require domestic political consensus. And if it happens with production in the United States of binary munitions in progress, domestic opinion in Europe will be too alert for any such executive action to be taken in secret, and the necessary political consensus would have to be a broad one.

Two factors to conclude, it seems to me, to militate against that consensus being reached, not just now but into the foreseeable future as well.

One factor is this: As Western Europe becomes still more populous, as urban areas encroach still more deeply into the potential battle

zones, the concerns about poison gas casualties to civilians will not go away; they will increase. They will remain yet more sensitive perhaps as a source of European domestic opposition to the prepositioning of chemical weapons.

The second point is this: As time goes on, chemical weapons, whether they are binary or any other, are going to become harder to integrate into the NATO force posture. The trend in NATO armament is toward weapons of greater precision, greater single-round effectiveness, reduced collateral damage.

Against that background, against that trend, which is now beginning, which is gathering strength, chemical warfare forces must inevitably appear more and more archaic and obsolete. So the necessary political consensus that must be arrived at may then fail to capture not only popular opinion but military opinion as well.

So my conclusion is that Washington is very probably deluding itself if it thinks active European support for the binary program will materialize during the coming years. There is, as has been referred to earlier, indeed a risk at the moment that the binary program will eject stocks that are already there. That is a matter of concern to people who value their stocks as part of the deterrent against chemical warfare. There is surely no chance at all of European support while the chemical arms control negotiations are effectively in abeyance.

Those, Mr. Chairman, are the principal points I wanted to emphasize from my paper. Thank you.

Chairman HATFIELD. Thank you very much, Professor Robinson.

Senator Bumpers, do you have some questions?

PERCENTAGE OF CHEMICAL AGENTS IN USABLE FORM

Senator BUMPERS. Dr. Meselson, let me ask you just two or three general questions. And without getting into the classified quality of the number of tons of chemical agents the United States has in its arsenal, could you tell me what percentage, if you know—I don't think this is classified, Mr. Chairman; if it is, don't hesitate to call me down—what percentage of chemical agents in this country are presently in usable form?

Mr. MESELSON. Senator, the number is rather rapidly changing. I can tell you more effectively what percentage it will be at the conclusion of the current maintenance program. I can also talk about that more freely because that number has been published in Senate testimony. That number is 7,000 agent-tons. In other unclassified sources, the total amount of the stockpile has been referred to, including both bulk agent and weapons, as being in the range of 30,000 or so pounds, 30,000, 35,000. That would be a—

Senator BUMPERS. Has that been testified to here?

Mr. MESELSON. Yes. That has been testified to by—that number, I am not sure. I am certain it has, because it has been around for years. One reference to it is in the Marine Corps Gazette that I can think of off-hand rather quickly. That would be a ratio of 1 to 5; in other words, 20 percent.

Senator BUMPERS. You mean 30,000 tons, do you not, not pounds?

Mr. MESELSON. Yes, tons. Did I say pounds?

Senator BUMPERS. I think you did.

Mr. MESELSON. Absolutely right; tons. In other words, 7,000 is about a fifth of 35,000. However, that 35,000 includes a great deal of bulk agent. If we were to consider only the weapons, then instead of 20 percent, I suppose it would go up to around 40 percent.

See, the bulk agent was made, in part, in case of extended chemical war. When it was first made, you could start filling munitions and supply the battlefield that way. That concept I think is greatly diminished now. But the reason we made so much bulk was connected with that.

So more than the percentage, it seems to me what is important is the numbers, the actual numbers. Are they even from the point of view of chemical retaliation? If that doctrine is correct, are they numerically adequate? Seven thousand agent tons is in terms of artillery—well, if it were all artillery, it would be about 1.4 million rounds.

Senator BUMPERS. Would that be 155's and 105's both?

Mr. MESELSON. No. The 105's would contribute a little, but not much. It would be mainly, as far as artillery goes, 155's and 8-inch.

Senator BUMPERS. We are phasing out our 105's. So whatever we had in our chemical weapons in 105's is virtually worthless to us, is it not?

Mr. MESELSON. Any Army man would agree with you. The Marines would flinch because the Marines depend on the 105's and will continue to do so. If there are any Marines in the room, they wouldn't agree with that. And also our allies maintain 105's. But you are right; the Army is withdrawing the 105's.

SOVIET ACTIVITY IN AFGHANISTAN

Senator BUMPERS. Dr. Meselson, aren't you a member of some organization that is officially sanctioned, or maybe financed by the Government, in determining the studies that have been ongoing both here and in the United Nations as to what the Soviets have actually done in Afghanistan? Are you privy to any of the information that the Soviets—

Mr. MESELSON. No. I served the Government in connection with the events in Sverdlovsk. Even with yellow rain or Afghanistan, no connection at all.

Senator BUMPERS. So you couldn't comment at all on what, if anything, the Soviets have done in Afghanistan?

Mr. MESELSON. Not knowledgeably.

Senator BUMPERS. Would you agree with me that if they have done something, if they have even used a nonlethal agent, is it your belief they would have done so if the Afghans had had a similar capability?

Mr. MESELSON. My belief is if the Afghans had had gas masks and if the Russians had done this, it would have been totally ineffective. Retaliation, I think, in that case isn't as relevant actually as protection. All of the both proven cases and alleged cases of the use of gas since World War II—there are about 20 of them—involve the use or alleged use against forces without gas masks, never against forces with gas masks.

Senator BUMPERS. What we want to do, Dr. Meselson, is make it so it isn't used by either side, but not be used by one side and hope the other side can defend against it, isn't it?

Mr. MESELSON. Yes. The argument is even if we maintain a chemical deterrent force, that will reduce the likelihood chemicals will ever be used. I think it is a two-edged sword. I don't know how to predict which way it would go. But I see the nightmare on the other side of that coin that is almost never discussed.

Chemical weapons in principle have, I would say, the two most threatening characteristics that a weapon can have. One, they threaten to cause immense civilian casualties, unlike conventional weapons at all, just totally different. But they also—and this is the point where there could be controversy—I believe it has not at all been established they are effective. I think it is quite possible they would be ineffective against defended sources.

Consider the following scenario: The Soviets and NATO are involved in a war. In a desperate moment of a breakthrough attempt, the Soviets decide to use chemicals. Whether or not that will help them will depend, I would say, almost totally on whether or not NATO forces are properly trained and warned.

Senator BUMPERS. And also which way the wind is blowing.

Mr. MESELSON. And which way the wind is blowing. But it is possible that that initial strike will be devastating in its consequences, particularly because the learning curve for chemical warfare is very steep. You could be caught by surprise. We might then, if we are relying on a doctrine of retaliation in kind, be tempted to fire back. Of course, we would if that was our doctrine.

Now if I am right, and 5 percent is enough chemicals for the basic load, which is a lowish amount, even with that lowish amount, after the hours of a first strike, you can be sure commanders are going to shoot back a lot more than 5 percent. One thing is sure. Each chemical round they fire is some other kind of round in some desperate moment they don't get to fire. Therefore, the effectiveness of conventional fire power will be reduced 15, 20, 30 percent with the chemicals you do fire.

Now, the Soviets are going to have warned their forces all up and down the front before they use chemical weapons, if indeed they do. Under that situation, the short-term impact of the chemical weapons on them, it seems to me, would be minimal. You have, therefore, the makings for the following situation. And I admit this is a worst-case scenario. But if we are going to get into worst-case scenarios on the other side, we had better look at this one.

It goes like this: After that event, the civilian populations of Europe are putting on their governments the most extraordinary political pressure either for surrender or for immediate escalation to the use of nuclear weapons. Meanwhile, we have put ourselves in a position where that breakthrough attempt may succeed because we have reduced our conventional fire power in those subsequent hours by a substantial percentage. Therefore, I am not at all sure that chemical weapons don't have the characteristics of bringing on the very thing they are intended

to avoid, not only the use of chemical weapons but possibly even the escalation to the use of nuclear weapons. Those things need to be looked at honestly.

The key question underlying it is, Is it really true that by forcing a Russian soldier into his gas mask and his poncho, protective equipment, that you are really going to slow him down? I just don't believe that. It certainly wasn't true; that kind of effect was not true in World War I. There were effects, but they were not massive. And since then the defenses have all become much better. And the competitor weapons, conventional weapons, have all become much better. But the chemical weapons haven't become all that much better. So from that broad point of view I would say that this is a very dangerous doctrine we are beginning to embrace, especially to go for it massively in the way the numbers here would indicate.

Senator BUMPERS. If we follow that logic to its ultimate conclusion, would that not mean that it would be preferable not only to go binary, but to destroy what we have?

Mr. MESELSON. That scenario I painted for you depends a great deal on the magnitude of our response. That is, the bigger our response, the more we rely on chemicals, the more massive retaliation we contemplate, the worse that scenario gets. So yes, it could be that there is a strong argument for not having any policy of retaliation in kind in Europe. The key uncertainty there is to what extent do chemical weapons have any military effect? We have no real studies of that. We have anecdotes. I am not being dogmatic about it either. I am saying from World War I, it looks to me the result would be they are not very effective. But we don't have more than that.

FAILURE OF GERMANY TO USE GASES IN WORLD WAR II

Senator BUMPERS. The Germans had a lot of chemical agents—mustard and other agents—which they never used in World War II. Would you venture a guess on what you read and study as to why they did not?

Mr. MESELSON. I would say two things. The kind of retaliatory policy we had was not a battlefield retaliatory policy. It was taken to mean the retaliation against cities, against citizens. That was the great fear in World War II.

Beyond that, I imagine the kinds of studies that were done by our military people were also done by the Germans. You heard Dr. Hormats talk about one of those. He understated it quite a bit. That was a very well-known group organized by Vanderbar Burke and James Conan from Military Operations Analysis under the National Defense Research Council. With that large staff of military people brought in fresh from the battlefield, they looked at scenario after scenario, where would chemical weapons help. They could simply find no important case.

So I would say there was both military—maybe they were wrong—but there was military disinclination and there was military threat against mainly civilians. So I don't think those conditions are transferable to the future.

Senator BUMPERS. You know, the Soviets—one of the things that has been disturbing me, I would divinely wish that all chemical warfare agents could be removed from the face of the Earth, just as I would wish the same thing about nuclear weapons. Unhappily, this is not a perfect world. The Soviets have refused—we have leveled accusations and allegations about what the Soviets have done in Afghanistan and they have violated Geneva by refusing to discuss it with us. Now, that doesn't bode very well for future negotiations in the whole field of chemical agents, does it?

Mr. MESELSON. These events in Afghanistan, reported from Afghanistan and Southeast Asia, are certainly very disturbing. The Geneva Protocol doesn't cover that. But I don't know our Government has tried—

Senator BUMPERS. The protocol did, did it not?

Mr. MESELSON. No. It just said the use of these is not prohibited, but it doesn't have any consolidated provision. That is probably one of its weaknesses.

Senator BUMPERS. It doesn't have any requirement that once an allegation is leveled, that you must discuss it.

Mr. MESELSON. Not the Geneva Protocol of 1925, which is the only agreement specifically about chemicals. But beyond that I am not convinced, Senator Bumpers, that our Government has really tried in a competent way to have those discussions.

Senator BUMPERS. I am not either.

Mr. MESELSON. I could tell you some reasons why I say that. Even with best intentions on both sides, it is possible to have lots of misconceptions and misinformation. But I am not sure, and I do believe that I have heard it said on several occasions by authoritative individuals in Geneva that in the context of those bilateral chemical weapons negotiations, that such talks about compliance issues would be possible. I think that it would be no cost to us to resume those talks that we are boycotting and see if we can do it.

Senator BUMPERS. I couldn't agree with you more on that.

Mr. MESELSON. But in any case, no matter how great the Soviet performance, if it is proven to be as bad as the worst case says it is, and that is conceivable, I don't see why we should get ourselves in a posture where we are wasting money on weapons that are not very effective, which can't be deployed, where we are not doing the kind of homework we need to do to find if even worst disasters might come about with a policy of reliance on large-scale chemical retaliation.

ON-SITE VERIFICATION

Senator BUMPERS. We can't have a treaty—I think you can have a nuclear arms treaty, but I do not believe you can have a chemical agent treaty without on-site verification. Would you agree with that?

Mr. MESELSON. Absolutely.

Senator BUMPERS. Is it your belt-buckle feel that the Soviet Union will or will not ever agree to such an on-site inspection?

Mr. MESELSON. I can't predict the future. I know they did agree, to the surprise of quite a few people, to the principle of international on-site inspection by challenge in connection with the Chemical Warfare Treaty. In July 1979, the joint communique from those talks stated that agreement. But we could never get them to tell us in detail under what conditions those on-site international inspections could be done.

Senator BUMPERS. That is right.

Mr. MESELSON. Now all I could say to your question—I wish I could say more—is if we want to find out, the only way to find out is to spend a few thousand dollars necessary to maintain the diplomats living and traveling to Geneva to talk to the Russians about that. We are not doing that. We have boycotted those talks.

Senator BUMPERS. I have taken too much time already, and I am sorry, Mr. Chairman. I have one more question.

If you had your choice between two things, not the ultimate, not the best of all worlds, not anything we have talked about here, but if you just had a choice between right now seeing everything we have, whatever it is, 30,000 tons or whatever, immediately disappear from the face of the Earth, to be replaced by binary, if we were going to have to have something, if we were going to have chemical agents and a chemical warfare capability, and you had a choice of all we presently have immediately disappearing from the Earth and being replaced by binary, would you accept that?

Mr. MESELSON. From a purely military and technical point of view, I would say absolutely not.

Senator BUMPERS. How about safety? Just safety to the civilian population right now.

Mr. MESELSON. The only real danger to the civilian population is if one shoots these in a war. There have been no civilian casualties, as Senator Garn pointed out, or even very serious accidents. As Senator Garn pointed out, the so-called danger of the existing single-filled stockpile has been wildly exaggerated of those leaking Weteye bombs. As he pointed out, the leaks are so minor that even if a person were inhabiting the air space between the bomb and protective cannisters and living there, he would not get a lethal dose.

Chairman HATFIELD. Senator Garn offered to go in the bunker where there was leakage occurring, Senator Bumpers. [Laughter.]

Senator BUMPERS. He may insist I go with him.

Mr. MESELSON. I would say from a military point of view it would be a foolish thing to do, because first of all, not even the one ready for production has ever been tested in live form, and the extra volume shipping requirements on binaries, I don't see why military commanders would welcome those features.

Chairman HATFIELD. May I invade, Senator Pryor, for just one question and then turn the gavel over to Senator Bumpers in that I must go to another hearing.

Senator PRYOR. I am about through, but go ahead.

Chairman HATFIELD. I just wanted to ask Dr. Robinson one question.

EFFECT OF BINARY PROGRAM ON SMALL WORLD POWERS

Dr. Robinson, if the super powers or the major powers determine this is a worthwhile weapons program to pursue, what impact do you see this having in terms of proliferation amongst the small powers of the world that are trying to imitate us in the nuclear arms area and/or the impact upon terrorist groups, that the proliferation of that type of weaponry might become available or they might have access to it? Would you like to briefly comment on that?

Mr. ROBINSON. On the second part of your question, sir, on the terrorists, I was trained as a chemist in my student days and indeed I was a rather enthusiastic chemist hobbyist. I used to make these things in the laboratory. From experience I can certainly say there is no particular technical difficulty in making both high explosives, the type that goes into boxes, and indeed some types of chemical warfare agents. For a person with training in comparative chemistry, these are not very serious problems. To conclude from that that it would be easy for terrorists to have access to chemical weapons, well, yes, it is quite tempting to conclude that. There are problems in a way which, perhaps, it is not all that proper one should discuss too much in public. But, yes, there does seem to be a real risk there.

I think you are absolutely right to relate it additionally to the wider proliferation question, proliferation at the national level rather than the subnational level. Proliferation is one of the very real worries we have in Europe. This is one of the things which is driving us to put pressure on for the chemical arms limitation agreement. Our fear is once the binary program gets underway, the path will have been set. The leader of the world in military technology will be seen to be taking an interest in poison gas, once again after a decade, decade and a half, of abstention. Governments that haven't been in the business before will start to question the reasons for not having done so.

The motives of proliferation reside partly in incentive, of course, but it is in technical accessibility. You have to have the industrial base to produce these things. This is a matter which has actually been studied under contract by the Research Institute for the U.S. Government—a good while ago, mind you, the late sixties, early seventies. They took a series of type countries to examine their industrial base, their ability to produce militarily significant supplies of nerve agents within a short space of time. And to illustrate something of the sensitivity of the problem in European eyes—and perhaps I should say more particularly British eyes—let me say the type country which they judged most capable of acquiring chemical weapons quickly was Argentina.

Chairman HATFIELD. Thank you very much. I want to thank each member of the panels who appeared here today for your contribution. The second session of this hearing will occur tomorrow afternoon at 2 p.m. when we will have representatives of the administration testifying.

I am delighted to invite Senator Pryor back and also at this time to turn the gavel over to him.

Senator PRYOR. I don't know whether I have the legal authority to preside over it.

Chairman HATFIELD. Let us momentarily grant that authority.

Senator PRYOR. I have two or three very quick questions just for the record.

Chairman HATFIELD. Please proceed.

Senator PRYOR [presiding]. Then we will adjourn the hearing.

AVAILABILITY OF BINARY PROGRAM TO THIRD WORLD COUNTRIES

First, Dr. Meselson, we have talked about how much safer to produce and to transport and easier, notwithstanding the weight problem, the binary system might be over the conventional or traditional. You stated, I think, that in 2 or 3 minutes on the battlefield the binary could be assembled, that the binary weapon could be assembled to become lethal. That in itself concerns me because I think we may be on the brink of creating sort of a "Saturday night special" of the chemical world because of its ease in handling and its capability, and I especially think about availability to Third World countries and peoples that we certainly would not want to see this weapon in their hand. Do you have any comments on that?

Mr. MESELSON. I think there is a lot to be said for that concern, Senator—not so much, however, in the battlefield use of the weapon but in the manufacture. The thing that is made greatly easier by the binary technology is the protection of the people who make them. Small countries, poor countries, dissident groups, nongovernmental groups, would find it very challenging to construct the kind of factory with very special valves, very special pumps, pipes without pipes, to avoid the workers getting killed by a leakage in accidents in the manufacture of regular nerve gas.

The thing about the binary concept is it does away with all that. Once it is in the field, I don't think it makes it easier. I think there it is about the same. It is really at the production where the Saturday night special characteristic might come in. So you might have more hands possessing binaries together with the factor to which Dr. Robinson referred; namely, that the keeping up with the military Joneses does have some impact. People want modern weapons. If the United States is going to lead the world into this new dimension, there will probably be others who would like to follow.

Senator PRYOR. Dr. Meselson, would you please evaluate for the committee the Chemical Corps record of success or failure in managing both the offensive and defensive chemical weapons programs that we have?

Mr. MESELSON. I think that in those areas what the Chemical Corps does—let's refer to it as the Chemical Corps—as based on daily experience, they have done an outstanding job. The maintenance of safety of the stockpile, which is based on daily hands-on experience, has been superb.

On the other hand, those things which depend on dealing with development of munitions, perhaps understandably because this is a field which is—these weapons haven't been used since World War I, to put it simply. That record has been poor.

None of the people involved in this are still in business, but we made 20,000 tons of an agent called Luicide. We decided it was a very good agent at the close of World War I and kept on thinking so to the eve of World War II when we made all of that, only to find out, only to realize a very simple thing that should have been realized before. It wasn't—that in human atmospheres, it is almost useless because the fine spray reacts with water.

We made large quantities of much more recent agents containing BZ, a psychochemical agent. We then abandoned the concept after making large quantities of the agent because we realized it might make enemy soldiers fanatically minded, and this would not be a good thing.

Quite recently the Israelis discovered in Egyptian vehicles that had been supplied to them by the Soviets an antidote for nerve agents called TAB. This was reported to General Abrams as a great advance over us, to indicate the Soviets had the intention of the use of chemical weapons. We carbon copied this material and issued it to our troops in Europe and airmen in Europe before doing proper tests. The Food and Drug Administration insisted each injector have the words on it, "Investigative drug use only." When the necessary investigations were done, after the men had been issued this instead of our standard antidote, which is Atropene, we found it causes extreme hallucinations. The Air Force instructed airmen if they should by accident get injected with this to bail out immediately. The Air Force and Army withdrew all of these carbon copies. Now they are going back to Atropene, the old one. And to add insult to injury, it appears this was never a Russian antidote. It appears the Egyptians purchased it, not from the Soviet Union, but from somewhere else.

Another great, I would say, defect has been the management of the stockpile which is now being improved greatly. But that, I think, was more reflective of the earlier Army view that these weapons weren't worth much. Even now I see evidence of lack of familiarity with the importance and I would say almost universally known practices of this warfare. I have seen over and over again statements on chemical weapons, including statements made only in the last few days, about the value of our stockpile of mustard munitions, the implication mustard is useless because it freezes at 57 or 58 degrees. That is an altogether new concept to me.

In the winter of 1917-18, which was largely well below 57, 58 degrees Fahrenheit, the U.S. expeditionary forces did not enjoy the pounding they received from German mustard. It is simply technically erroneous to believe that the vapor hazard from mustard does anything when it freezes.

Mothballs, if I could use a very homely analogy, are solid, like frozen. But that doesn't mean the vapor from them isn't an adequate agent for dealing with moths. This is technically incompetent.

There are many other indications that there is inadequate appreciation of the characteristics of chemical weapons on the part of those who are planning our chemical weapons policies.

Senator PRYOR. This is just as a trivial matter, but am I not correct in World War I, wasn't it, Cpl. Adolph Hitler was exposed to mustard gas or another form of poisonous gas?

Mr. MESELSON. He certainly was exposed to chemical agents. I am not certain whether it was mustard. I believe my colleague, Dr. Robinson, would know. He says it was mustard.

Senator PRYOR. You stated, Dr. Meselson, that the Army and the Chemical Corps, et cetera, in charge of storing and caring for, let's say playing nursemaid, to the existing stockpile, never gas chemical warfare agents, that they didn't put much value on the stockpile. Could that also be taken to mean that the same individuals or the same mentality or thinking feels that if this stockpile deteriorated, that then they could get a new supply? Did they discourage or did what they did by even inaction or negligence, contribute to its more rapid deterioration or head it toward obsolescence, if, in fact, it is obsolete or it has deteriorated?

Mr. MESELSON. I really don't know of any evidence that the stockpile was allowed to—it isn't deteriorated. It was allowed to become non-serviceable. Much of it can be made serviceable again. I don't know of any evidence that that was done in order to create a need for binaries. One of the main reasons for a great deal of it being unserviceable was simply that the explosive charges needed in the centers of the artillery projectiles were either cannibalized—that was removed for service in Vietnam for regular munitions—or never provided.

What I am concerned about mainly, though, is that the homework which is necessary in order to form a coherent and reliable policy in this area seems, at least in the past, not to have been done.

Senator PRYOR. I want to thank both of you. Senator Bumpers may have something here.

I would, Senator Bumpers, if I might, ask permission of the committee to put this in the record. I think this is a splendid New York Times interview with Dr. Meselson and General Fulwyler. It is dated May 2.

Senator BUMPERS. It will be admitted into the record.
[The information follows:]

New York Times 5/2/82

A ROUNDTABLE: Binary Chemical Weapons

SHOULD the United States produce new binary chemical weapons? The question is scheduled for debate in the Senate this week when Senator Mark O. Hatfield, Republican of Oregon, holds hearings in the Appropriations Committee and amendments to the Pentagon's authorization bill are offered on the floor. The Administration would like a go-ahead, and has asked for \$32 million to develop the new munitions, which consist of two nonlethal components that are packaged separately and combine to form a toxic agent only after a shell or bomb is in flight. The amount is relatively small as military budget/ go. But the question itself is highly charged. The Week in Review asked Maj. Gen. Niles J. Fulwyle, director of the Nuclear and Chemical Directorate, Department of the Army, and Matthew Meselson, professor of biochemistry at Harvard University, to talk about the pros and cons. Excerpts of their discussion with Richard Halloran, a correspondent in The Times's Washington bureau, and Caroline Rand Herron, an editor of The Review, follow.

Question. Do we need more, better or any chemical munitions, and why now?

Mr. Meselson. General Fulwyle and I agree we have to assume the Soviet Union poses a major chemical threat. Where we begin to disagree is in the response. In my opinion, the response which the Army has recommended and which the President has endorsed is dangerous and wrong.



Gen. Niles J. Fulwyle

This follows from a unique characteristic of chemical weapons. The military advantage against a sophisticated opponent is simply to force the other side into their protective equipment (and) decrease tempo. This has two important consequences. The munitions requirement is very small.

The other thing, though, about chemicals is that they selectively exterminate civilians. A civilian goes down into his cellar, the way civilians do to avoid high explosive fire — he's going down into his gas chamber. Quite aside from the moral implications of that, that means that if you're thinking about alliance warfare on somebody else's real estate, mainly Europe, those people aren't going to let their soldiers use chemical weapons in their defense.

General Fulwyle. Unfortunately, civilians have been subjected to the violence of war in every war we've ever had. Now that is not good, but it has occurred.

Mr. Meselson. We need to look at these things more quantitatively. You can calculate the ratio of military deaths to civilian deaths under various kinds of scenarios. With chemicals, you might end up killing 20 civilians for every soldier; with high explosives, far, far less. Even in tactical war in Europe, the ratio would be less.

General Fulwyle. The first reason that we want the retaliatory capability is, of course, to deter use. But, secondly, if the adversary uses chemical and forces us into protective clothing, if we do not have the capability to force him into protective clothing, then we're fighting with one or one and a half arms tied behind our backs.

Mr. Meselson. We already have many more than enough artillery shells (containing chemical weapons) to accomplish the objective which General Fulwyle and I have been discussing. They are not deteriorating, contrary to a myth that is prevalent; they are not obsolescent, contrary to a second myth.

General Fulwyle. Perhaps the agent deterioration itself is not all that great — except it does occur. (But) we have containerized today over a thousand different types of artillery munition that have been leaking.

There's another type of deterioration. The M-55 rocket, we don't have a delivery system for; the rocket launcher is no longer in inventory. We have a sizable part of our stockpile in the 105-millimeter howitzer, which is rapidly being phased out of the Army inventory.

Q. Are binaries the most efficient addition, in terms of storage, transport, battlefield use?

General Fulwyle. We believe so, particularly on production, storage and transport. We never join the second chemical precursor until in the operational site, which means that that round, for all practical purposes, is safe up until the time it is finally loaded. And those various compounds themselves are relatively non-toxic. The difor that will be used in the 155, as an example, is not as toxic as tear gas. And we believe, based on over 2,500 test firings of the 155, that the binary concept will be just as effective as the current unitary rounds.

Mr. Meselson. There has never been a single test firing in the present configuration. You can't test one thing by testing another.

General Fulwyle. Well, the configuration wasn't that much different. (And) we do not need live testing because we can do all the necessary testing in a laboratory environment with modern technology.

Mr. Meselson. General, you know that we want to resume testing. I'm all for it, I think we should. To issue untested munitions to the troops is wrong.

But let me talk about the need for them, not whether they're any good. You are participating in the perpetuation of a harmful confusion. Do you know that all of our nerve gas (in) artillery ammunition is today classified Code A? Code A means, and I quote, that 'fully meet all military characteristics, issuable without limit or restriction.' The only way you could generate a bigger requirement would be to assume a long war in which all our allies are also using nerve agent at a high rate.

The Deterioration Factor

General Fulwyle. You do not have access to —

Mr. Meselson. Yes, I do. I've written a classified report on the stockpile (in January 1981). And it's gone up, not down, since then.

General Fulwyle. Still, I have concern about you making statements concerning the status of our stockpile, when I believe, Professor, you do not have timely information.

Mr. Meselson. Can you refer me — because names of documents are always unclassified as names — to a single existing document saying that the stockpile of munitions are deteriorating at such a rate that in a few years we won't have any?

General Fulwyle. I don't know if there's a study or not, but the information that I have would lead me to say unless we do something, by the end of this century we will have unilaterally disarmed.

Q. Mr. Meselson, what would be your formula for acquiring sufficient deterrent?

Mr. Meselson. There are two parts to that. The first is protection in defense. We have a good protective suit, and a better one is coming along. We have a mask which is somewhat maligned; whether a better one is coming along I don't know.

But where we fall is troop training, except for certain specialty units like the 82nd Airborne. I talked to a colonel from the 82nd Airborne; he says that his men relish the chemical suits. But most soldiers are not practiced in the equipment to the extent they should be.

As far as our deterrent stockpile is concerned, if we press ahead with what I consider to be these useless weap-

ons, which are complicated, almost four times bulkier to ship, 10 percent heavier to ship—

General Fulwyler. That's wrong! We can (ship) almost twice as many of the binary rounds as we can a unitary round.

Mr. Meeseisen. General, the numbers you're talking about refer to not having the fuse or the cannister (and packing materials).

General Fulwyler. That's correct, you're not shipping both at the same time. In the interests of safety, we would not plan to ship them on the same aircraft.

Mr. Meeseisen. Then there's not twice as many.

But my point is that if we overemphasize chemical weapons, which we are on the verge of doing, then two very bad things could happen.

First, there is already on the agenda of the German Social Democratic Party a resolution to withdraw the stocks there. They're the only stocks which are ready to use. This resolution is provoked by apprehension that we are going to overemphasize chemical weapons. The other great danger in overemphasizing the chemical weapons is that if they are ever used against us, our second strike by definition has got to be a lot less effective. Because anyone who would use them first against us is going to prewarn all their forces to protect themselves. Whereas the first strike on us has a chance of catching us by surprise.

Therefore, to the extent that we advertise that we're going to make very much more than we already have on hand, which is a lot, we risk propagating the view that we are unlikely to use our nuclear weapons ever. This undermines the deterrent to war itself.

General Fulwyler. Professor, I think you're really stretching the rationale on that one.

Let me hit just a couple of things.

We have done some tests last year with soldiers with the protective clothing on, for instance, in tanks, and the time by which we had to get them out of the suit or risk a health hazard to them was about 40 minutes.

About the overemphasis on chemical — well, on the defensive side we're paying the price for an underemphasis for a number of years. We can and must make improvements. Over and above that, though, I still maintain that the best way to deter the Soviets' use of chemical agent is for us to have a credible retaliatory capability. That means one in being, one that constitutes a threat and one that he knows that we can hold him at risk at. And the current stockpile does not offer that.

Mr. Meeseisen. Even if the wearing of this equipment, which I believe has had its burden exaggerated, is a burden, that just means that the objective of having these munitions is to force the other side into such equipment. We have at present far more than enough to do that.

The intent to produce another type which is not needed and which has not been tested in live form in the field is likely to do more to enrage our allies — we're not doing us a particle of military good. Besides that, binary

is complicated to assemble in the field.

General Fulwyler. That is not true, Professor! It's a very simple weapon to assemble in the field. Two to three minutes at the most.

Mr. Meeseisen. I agree that it can be assembled in the field, the piece time rate is probably an underestimate — but no commander prefers to have to do that.

Q. To close, let's talk about something that takes more than three minutes or 26 years, apparently, and that's the chemical warfare treaty, and the now apparently abandoned push for a total ban. How does our current posture help or hurt that endeavor?

General Fulwyler. Well, of course that's one of our points, too. We believe that what we're doing with the binary program is probably going to give us the best leverage at the negotiation table.

Incentives to Negotiation

We have been sitting at the table with the Russians since 1977, and during that time we have seen little or no progress at all. And at the same time, we believe that the Soviets have gone forward and continued to improve their posture. There has been no incentive for them to make any meaningful proposals or agreements.

Mr. Meeseisen. I can't evaluate that, because that is a psychological question. But I can say something about the negotiations. It depends on how you look at the record (as to) whether it represented progress. And I wouldn't dogmatically assert one or the other. We have agreed with the Soviets — and we announced in July three years ago in a joint communiqué with them — we agreed on the principle of on-site international challenge inspection. But that's not good enough for us.

We're the ones who cut off these talks. We should resume them. Whether or not we could get agreement on the kind of verification that's needed, I don't presume to know. We should just keep trying.

Quite aside from the fact that millions of Europeans are at risk of dying in any large-scale chemical war in Europe, the military implications of that have gone unappreciated. You cannot fight an alliance war with allies who won't use the weapon. It's dreaming to think that they will allow their troops to use it.

The Retaliation Boomerang

General Fulwyler. We got to live with the facts of the day, and the facts are that the Soviets are the best equipped nation in the world to wage chemical warfare. If the conflict is forced upon them, I would be willing to wager that anyone, including our allies, will be more than happy to accept that as part of the deterrent, if not to have it as a retaliatory capability if it is used on them.

Mr. Meeseisen. I strongly disagree. If we could imagine the war happening in New Jersey —

General Fulwyler. Do you think our allies would prefer for us to cross the nuclear threshold first as a counter to the Soviet use of chemical weapons?

Mr. Meeseisen. At the point where the Europeans see millions of their civilians dying that they would advocate that we not defend them anymore — which we hope they wouldn't do. That's exactly what chemicals might achieve, because it puts them in a position where the continuation of that war would involve a catastrophe of strategic proportions for them due to chemical losses.

General Fulwyler. If we cross the nuclear threshold, that is going to be a catastrophe of greater immensity.

Mr. Meeseisen. Yes, but I think that chemicals can bring that on.



Matthew Meeseisen

PROJECTILE TESTING

Senator PRYOR. We thank both of you for coming here today.

Senator BUMPERS [presiding]. Dr. Meselson, the Army says on this business of whether or not this has been tested, that they tested 2,758 projectiles during the development program. This included extensive evaluation of the agent dissemination characteristics, flight performance, and hardware integrity. Other tests utilized simulants in lieu of binary precursor chemicals.

To insure the adequacy of the simulant testing, 17 simulants were evaluated and 82 firings were conducted to validate the simulant technology. To correlate the simulant testing and demonstrate the binary concept for GB nerve agent, 340 reactor tests of scaled-down 155mm projectiles and 43 full-scale tests were conducted in an environmental controlled chamber. Of these, 347 tests utilized the actual binary precursor chemicals to produce GB nerve agent. These tests demonstrated that formation of GB from binary precursor chemicals was highly reproducible, predictable, and efficient. In addition, one full-up M687 round with actual binary components was fired, the results of which conclusively demonstrated that the simulant and other testing measures used accurately demonstrated the designed weapon results.

How would you comment on that?

Mr. MESELSON. I would say the Army has done almost as good a job as can be done in testing a weapon without field tests. That is using simulants. The adequacy of this test program has been reviewed by a panel, convened by the Army, made up of Dr. George Abrahamson of Stanford Research Institute, Dr. William Burke of Arizona State University, the world-famous chemist Dr. Henry Eyring, Dr. Max Garbuny of Westinghouse Research Laboratories, and Elihu Grossmann of Drexel University.

In their conclusions they state:

It should be realized that this alternative—

which means production without field testing—

Severely weakens the deterrent value of the munition and sets the precedent for stockpiling ordnances not fully field tested and it produces unnecessary uncertainty in army planning.

Further:

Field tests of the 687 with GB must be undertaken before it can be regarded as a proven round. Without such tests, serious questions on dissemination effectiveness and particularly on flashing characteristics will be unanswered. To be of greatest value to the 687 program, the field tests should be undertaken as early as possible.

And further:

No matter how similar simulants may be to GB in their physical characteristics, there can never be one-to-one correspondence of the chemical species presented at burst. Hence, without a statistically significant number of test firings, there cannot be absolute confidence in the performance of a round.

I do not have any information that would lead me to believe that any of the panel members reviewing the information have changed their views. I know that it is the Army's publicly stated view now that the

testing has been adequate. I do not, however, believe that even the current Army officials responsible for this program would deny the great value to the development of adequate information about this round of field testing. I am rather confident in predicting they will ask for such field testing. I doubt advisers who have advised them in the past about the necessity of doing and the desirability of doing it before making the rounds have changed their views, although I haven't corresponded with them in that regard.

M121/121A1 GB 155MM PROJECTILE

Senator BUMPERS. On the other side of the coin, let me ask you to comment on this statement. The Army does not have a high degree of confidence in the reliability and functioning of the current unitary M121/121A1 GB 155mm projectiles because they have not been test fired/certified since the 1960's. In this regard, the current surveillance program indicates that the agent is being degraded due to munition/agent age and the structural integrity of the metal bodies is questionable because of possible deterioration of the metal components.

Mr. MESELSON. There are two issues there. One is that with the binary we are talking not only about questions of purity and so on, we are talking about the actual concept of the weapons. The concept of the single-fill has been tested in thousands of test firings in the field. The concept worked. During those tests, I should say, there were many design changes, even though that concept is a very simple one. The binary is not a simple one.

Beyond that, the question of so-called deterioration—what you have just read to me I find very discouraging. I assume that the individual who wrote that knows full well that the evidence of deterioration he is talking about is not in the weapons at issue.

The Army has just completed a series of tests on all lots of nerve gas and mustard agent in the present stockpile. There are four code categories, A, B, C and H. H means a candidate for demilitarization. A means issuable without limit of time, without restrictions. Every single lot of VX and GB nerve agent and of mustard in 155 and 8-inch rounds, heavy artillery rounds, which is what we are talking about here, is not code category H, it is not even C or B; it is A. Now, there are some other kinds of munitions which are B and C which are still issuable. Category B and category C are still issuable. But it is not true of the munitions at issue.

There is over and over again, I find, a game being played here which is to confuse either out of ignorance or deliberately one thing with another. This is a perfect example of that kind of confusion.

Senator BUMPERS. I spent a day in Pine Bluff a couple of weeks ago and it was a very interesting briefing. It was a very interesting day. I don't have to tell you how concerned I am about this whole issue. But what you are saying and the information I have been getting from the Army is at considerable variance. You seem to have the best credentials on your side of the aisle on this issue.

I am going to ask the chairman if we might have a closed executive session here and let you and the Army just debate. Let them make their statement, you refute it, and vice versa. I would like to hear a good debate between you and possibly your colleague and the Army. I hope that can be arranged, because I would like to see a faceoff on the issue. We are obviously getting two different kinds of information.

Mr. MESELSON. I think that is a marvelous suggestion. I think it is the only way to resolve some of these questions.

COMMITTEE RECESS

Senator BUMPERS. With that, we will stand in recess until 2 tomorrow afternoon.

[Whereupon, at 4:40 p.m., Wednesday, May 5, the committee was recessed, to reconvene at 2 p.m., Thursday, May 6.]

BINARY CHEMICAL WEAPONS

THURSDAY, MAY 6, 1982

U.S. SENATE,
SUBCOMMITTEE ON DEFENSE,
OF THE COMMITTEE ON APPROPRIATIONS,
Washington, D.C.

The committee met at 2:08 p.m. in room 1114, Dirksen Senate Office Building, Hon. Mark Hatfield (chairman of the full committee) presiding.

Present: Senators Hatfield, Stevens, Mattingly, Specter, Burdick, Leahy, and Bumpers.

Also present: Senator Pryor.

DEPARTMENT OF DEFENSE

STATEMENT OF RICHARD WAGNER, ASSISTANT TO THE SECRETARY OF DEFENSE, ATOMIC ENERGY

ACCOMPANIED BY:

TED GOLD, DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE,
CHEMICAL MATTERS

RICHARD R. BURT, DIRECTOR, BUREAU OF POLITICO-MILITARY AFFAIRS, DEPARTMENT OF STATE

CHARLES H. THOMAS, DIRECTOR, OFFICE OF SECURITY AND POLITICAL AFFAIRS, BUREAU OF EUROPEAN AFFAIRS, DEPARTMENT OF STATE

MORRIS BUSBY, DEPUTY U.S. REPRESENTATIVE TO THE COMMITTEE ON DISARMAMENT, ARMS CONTROL AND DISARMAMENT AGENCY

SUBCOMMITTEE PROCEDURE

Chairman HATFIELD. The committee convenes the second day of hearings on the proposed chemical weapons program. Yesterday we heard from five outside experts—three former Government officials and two members of the academic community—who have had long-standing involvement in chemical munitions issues. Today we look forward to hearing from members of the administration. It is my hope that the witnesses today will respond to the claims made during the first day of hearings, for frankly, there appears to be a widespread gap in factual as well as philosophical perspectives.

I would remind the committee and our distinguished panel of witnesses that the purpose of these hearings is threefold: One, to examine the sufficiency of our current chemical munitions stockpile and the wis-

dom of the proposed chemical buildup; two, to explore the political ramifications with respect to Europe of such a chemical weapons program; and three, finally, to discuss with administration officials their failure to comply with congressional directives on chemical weaponry matters as they relate to our allies.

It is my intention that the hearing remain in open session for as long a period as is practical. We will aim toward the hour of 4 o'clock and then begin a 30-minute period in closed session to discuss classified information which can help shed light on this issue. It is my understanding from our witnesses today that a major portion of this issue can be discussed on the open record. If, however, we discover it necessary to close the hearing before 4 o'clock, we will, of course, do so. I would like to invite the witnesses to raise that issue at any time in any of the questioning or any other part of this hearing if they feel that we are delving in classified material that should not be discussed in open session.

May I assure the witnesses that their full statements will appear in the record as printed. At the same time, I encourage all of you to summarize your remarks in order that we may have an opportunity to question each of you. We will proceed with the entire panel of witnesses first and then return for questions after completion of the panel.

I understand that since the writing of this opening statement, Mr. Burt, you have a difficulty in your schedule this afternoon. Therefore, what I would prefer to do is to change the order a bit and have Dr. Wagner lead off, the Assistant to the Secretary of Defense for Atomic Energy, to be followed by Mr. Burt, the Director of the Bureau of Politico-Military Affairs for the State Department, and then we will interdict at that point and have questions for you two gentlemen. That way, Mr. Burt can keep his schedule that is important for him to keep this afternoon.

Mr. BURT. Thank you, Mr. Chairman.

Chairman HATFIELD. Senator Mattingly, any opening remarks?

Senator MATTINGLY. No, Mr. Chairman.

Chairman HATFIELD. Dr. Wagner, if you would proceed.

Dr. WAGNER. Thank you, Senator Hatfield.

INTRODUCTION OF ASSOCIATES

As you may know, several months ago my Office, Assistant to the Secretary of Defense for Atomic Energy, was designated as the focal point also for all chemical matters within the Department of Defense. Since that time we have added staff to do this job. To help me in carrying out this job, we now have a newly appointed Deputy for Chemical Matters, Dr. Ted Gold, who is the focal point within DOD for pulling together the chemical program. I also chair the DOD Steering Committee on Chemical Matters which consists of representatives from throughout the Office of the Secretary of Defense, the Services, the Joint Chiefs of Staff, and the Defense Intelligence Agency. We, of course, do work closely with the Department of State, the Arms Control and Disarmament Agency (ACDA), and the National Security Council in working up the program.

In addition to Dr. Gold, I have three service representatives with me this afternoon, members of the DOD Chemical Steering Committee: Navy Capt. Jack Doyle from the Office of the Director of Strike and Amphibious Warfare in the Navy; Brig. Gen. Jerry Tietge, Deputy Director of Operations for the U.S. Air Force; and Col. Bobby Robinson, the Deputy Director of the Nuclear and Chemical Directorate, U.S. Army. Captain Doyle is representing Admiral Compton and Colonel Robinson is representing General Niles Fulwyler, who would have been here today but who is recovering from surgery. Also, Mr. Mike MacDonald from the Office of the Under Secretary of Defense for Policy is here.

I would like to follow the order as you suggested, with a pause for questions after Mr. Burt's statement. With your agreement, sir, I would like to go on after that to ask Mr. Busby from ACDA who is here to describe our arms control position briefly and then come back to Dr. Gold who will go into the bulk of the description of our program and address just the questions that you have asked we focus on with regard to the sufficiency of our current forces and the necessity for building up.

Chairman HATFIELD. Mr. Secretary, I would be happy to work out any sequence that you recommend. What is the exact time frame we are working against for you, Mr. Burt?

Mr. BURT. I have to leave at 3:15, Mr. Chairman.

Chairman HATFIELD. You have to leave here at 3:15?

Mr. Burt. Yes.

Dr. WAGNER. I have about a 10-minute overview and then we can go directly to Mr. Burt, 10 or 15, perhaps.

Chairman HATFIELD. All right.

REVIEW OF SOVIET CAPABILITY

Dr. WAGNER. I would like to start off with a short review of the Soviet Union's capability in comparison to our own, which I think is the crux of the issue here.

There are some gaps in our knowledge of what the Soviets can do in chemical warfare. However, available evidence indicates that our major adversary has developed and deployed a formidable capability to wage chemical warfare.

We do know that the Soviet Union has a military doctrine that foresees the use of chemical warfare and acknowledges its value, particularly when used in massive quantities and with surprise. They view chemical weapons as highly effective and believe they can achieve a high casualty rate against protected forces because of surprise and deficiencies in the defender's training and equipment.

We know that the Soviet Union has a wide variety of agents and delivery means for those agents. It has the potential in existing facilities to produce large quantities of chemical warfare and biological warfare agents. It has a large and well-trained chemical warfare posture in all of its forces and provides extensive protection for all of its forces.

We do not know very well the size of the Soviet Union's chemical munitions stockpile. Quantitative estimates of the Soviet stockpile are difficult to make. However, even the low range of the estimates of the usable agent-tons provides a quite substantial military capability.

We do not know very well where their chemical warfare munitions are deployed, particularly whether they are forward deployed with their Warsaw Pact allies. We also, I should say, don't know many of these things very well for many items of war materiel—bullets and protective equipment. We do not know those kinds of things terribly well for nuclear weapons, especially the forward deployed nuclear weapons.

We do know also that the size and the scope of their chemical warfare and biological warfare R&D effort indicates a very active program and probably includes development of new agents.

Despite the uncertainties and deficiencies of our knowledge, it is our view that the number and diversity, especially of the chemical warfare delivery systems, is clear evidence of a commitment to a major offensive capability and that that capability is supported by a production capacity which is sufficient to support the delivery systems.

SOVIET CAPABILITY

We can ask the question, have the Soviets invested so heavily in chemical warfare capability solely for defensive purposes? Well, perhaps. But in view of our widely known weakness in the area, which I will demonstrate in comparison with their posture in a moment, and the lack of a significant threat of chemical warfare capability from other nations, we believe it is unlikely that their posture is solely for defensive purposes. Rather, given that their doctrine provides for chemical weapons use, they have the lethal chemical warfare agents and a wide range of delivery means, their troops are the best trained and equipped in the world to fight in a chemically contaminated environment, and they are using and sponsoring the use of chemical agents today, prudence dictates we must take seriously their capability to wage offensive chemical warfare.

In contrast to the Soviet Union's developments, during most of the 1970's the United States allowed its chemical retaliatory capability to decline. We did little to improve chemical protection and we neglected relevant training and doctrine. The United States has not produced lethal or incapacitating chemical agents or tested or filled munitions since 1969. Further, in 1969, the United States unilaterally renounced the use of biological and toxin weapons and, subsequently, all biological and toxin stocks were destroyed.

MILITARY ADVANTAGE HELD BY SOVIETS

Because of these differences in our two postures, the Soviet Union today possesses a decisive military advantage because of the large asymmetry in our chemical capabilities. The advantages they enjoy in the conventional arena are amplified when the respective chemical capabilities are considered, and thus we believe there would be an incentive for them to use chemical weapons in potential future conflicts.

The essence of our argument is this asymmetry between ourselves and the Soviet Union.

I would like to use two charts, if I may, to illustrate that asymmetry.

USSR VERSUS US CHEMICAL WARFARE PROTECTIVE CAPABILITIES

	USSR	US
● EDUCATION AND TRAINING		
MILITARY CHEMICAL SCHOOLS	4	1
LENGTH OF LONGEST COURSE	5 YEARS	6 MONTHS
● CHEMICAL TRAINING BATTALIONS	19	1
● CONDUCTS CHEMICAL TRAINING	YES	YES
FIELD TRAINING AREAS	78	1
FORMAL TRAINING (HOURS/YEAR)	100-400	16-100
USE OF LIVE AGENTS	YES	NO
CW DEFENSE EXERCISES	YES	YES
● NUMBER OF DEDICATED PERSONNEL	~60,000	~8,500
● NUMBER OF LARGE MOBILE DECONTAMINATION AND RECONNAISSANCE DEVICES	8,000-12,000	<1,000
● INDIVIDUAL PROTECTION	YES	YES (QUALITATIVE ADVANTAGES)
● COLLECTIVE PROTECTION		
COMBAT VEHICLES, COMBAT SUPPORT VEHICLES, AND SHIPS	YES	NO
KEY FACILITIES	YES	VERY FEW
● DETECTION AND WARNING		
AUTOMATIC ALARMS/DETECTOR KITS	YES	YES
RECONNAISSANCE VEHICLES	YES	NO

The first chart focuses on our relative defensive or protective capabilities. I will not read all the way down through that chart. I will simply point out a few of the highlights.

Their education and training is much more focused than ours is and much more extensive, four schools to our one, and a range of courses ranging up to a 5-year course of study on their part. The longest course we have had is 6 months. They really train a much larger number of professionals in this area than we do. Large asymmetry in the number of training battalions. They conduct training in many more areas, much more intensively than we do—training of their troops, not as in the first part, the training of an officer corps.

They have about eight times the number of dedicated personnel in their active forces. There is a very large asymmetry in the decontamination and reconnaissance devices. We both have individual protection. We believe that our individual protection equipment has some qualitative advantages. We hope in the program that we are carrying out, to improve those defensive qualitative advantages in the individual protection area.

In collective protection, again the Soviets have a substantial edge. They have designed combat vehicles and ships with collective protection. We have not. Many key facilities have protective features built in; very few of ours do.

Finally, there is a similar asymmetry in the detection and warning aspect, which is especially important in giving warnings so the protective measures can be taken and without which many even good protective measures are much less effective.

USSR VERSUS US CHEMICAL OFFENSIVE/ RETALIATORY CAPABILITIES

	USSR	US	REMARKS
● TYPES OF AGENTS (##)			
NERVE	4	2	
BLISTER	6	2	
BLOOD	1	0	
INCAPACITANT	PROBABLE	0	
TOXINS	1 OR MORE	0	
● TYPES OF DELIVERY SYSTEMS			
AERIAL ROCKETS	PROBABLE	NO	
TACTICAL ROCKETS	YES	NO	
BALLISTIC MISSILES	YES	NO	
MULTIPLE ROCKET LAUNCHERS	YES	NO	
ARTILLERY AND MORTARS	YES	YES	
SPRAY TANKS	YES (MAY BE OBSOLETE)	YES	
BULK FILL BOMBS	YES	YES	US: NON PERSISTENT NERVE ONLY
CLUSTER BOMBS	YES	NO	
MINES	YES	YES	
● PRODUCTION FACILITIES	SEVERAL	0	

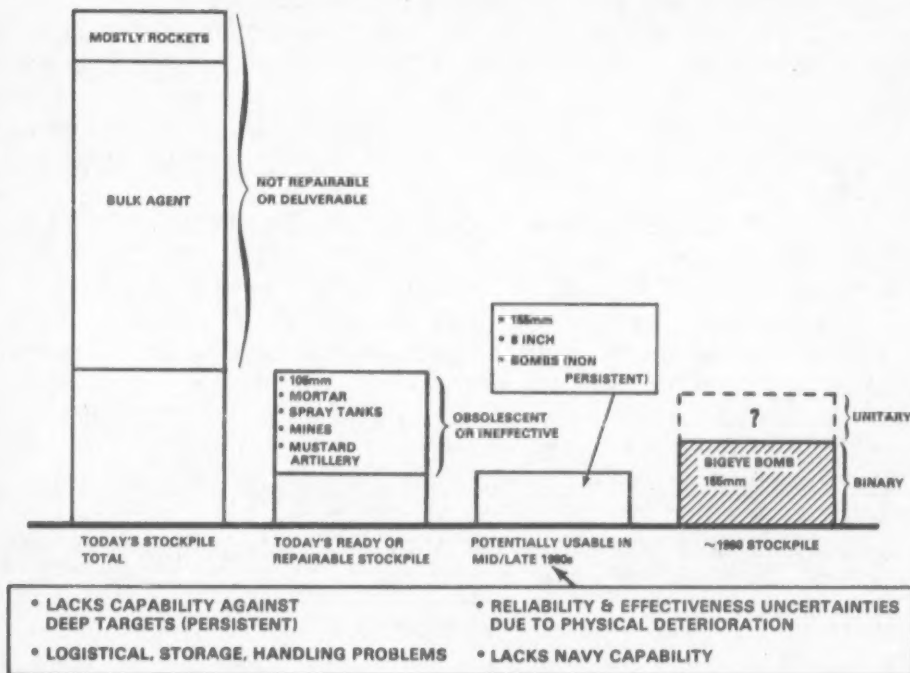
The next chart shows the position with respect to the offensive or retaliatory capabilities, in two general categories: One, the types of agents; and second, the types of delivery systems. I won't read through all of them; simply to note that the Soviets have on the order of 10 or 15 agents developed and deployed; we have 4 today.

The diversity of the agents is matched to the diversity of delivery systems. They have many more kinds of delivery systems than we do. Tactical rockets is perhaps the largest point of divergence between our programs. We have no tactical rocket delivery systems. I believe every one of the Soviet's tactical ballistic missiles is equipped with a chemical delivery capability which is matched closely to its system capabilities. They have multiple rocket launchers, artillery, and mortars. We have artillery, some spray tanks, and some bulk fill bombs.

Finally, in the area of new capabilities, the Soviets have an advanced capability in cluster or submunition chemical warheads.

These agent and delivery system asymmetries are amplified by the asymmetries in their production facilities that I mentioned earlier.

CHEMICAL MUNITIONS STOCKPILE



CIVILIAN CASUALTIES

Dr. WAGNER. I would like to turn for a moment at this point, while we are talking about retaliatory or offensive capabilities, to the issue I know was brought up yesterday, that of civilian casualties. I personally and everyone that I know of who has experience with the concepts and technologies of chemical warfare are horrified by the prospect of the use of chemical warfare. I think that there is certainly no belief on our part that the use of chemical weapons would not be accompanied by widespread civilian casualties.

Our program is intended and we believe it will in fact reduce the risk that chemical weapons will be used and, therefore, reduce the risk that civilians will be killed in large numbers by chemical warfare. We believe that risk will be reduced by reducing the advantage that the Soviets would have today in initiating chemical warfare, and thus reduce their incentive to use it.

Since World War I, I would like to point out, that in the several times in which chemicals have been used they have, without exception, been used against troops or civilians who have not had either protective or retaliatory capabilities. I would like to point out also that in World War II, in Europe, I think a strong case can be made for the fact that chemical weapons were not used even though both sides had them because there was this capability to retaliate against first use. So I truly believe that our program, of which retaliatory improvements are an in-

herent part, will reduce the risk that civilians will be killed with chemical weapons.

The administration's goal in the area of chemical warfare is a complete and verifiable ban on the development, production, and stockpiling of chemical weapons. Mr. Busby from ACDA will amplify on that point.

However, until such a ban can be obtained, our objective will be to deter the use of chemical weapons by both the defensive and retaliatory capability.

As you are aware, the United States is party to two treaties which impact on the areas of chemical and biological warfare. The first is the Geneva Protocol of 1925 which prohibits the use in war of asphyxiating, poisonous, or other gases, and of bacteriological methods of warfare. The second treaty is the Bacteriological and Toxin Weapons Convention which prohibits the development, production, and stockpiling of biological or toxin weapons. Toxins are prohibited regardless of their origin or method of manufacture.

Consistent with these treaties, the United States will not use chemical weapons unless they are first used against us or our allies. Also, the United States does not and, as you know, will not under any circumstances possess biological or toxin weapons.

PROBLEM OF VERIFICATION

While unilaterally restraining our chemical capabilities, the United States has made major efforts in the late seventies to eliminate the chemical threat by attempting to reach agreement with the Soviets on a comprehensive and verifiable ban on chemical weapons. As you know, verification is a complex and difficult problem. The efforts to negotiate a treaty stalemated principally due to fundamental disagreement on the essential issue of a need for effective verification and particularly, I must say, Soviet intransigence on questions relating to on-site inspections. On the other hand, a treaty with inadequate verification provisions is unacceptable.

I cannot overstress the administration's conviction that we need a prod to get the Soviets to negotiate seriously about such difficult issues as chemical warfare verification and compliance. In the past, because we have unilaterally exercised restraint by deferring our chemical warfare modernization, it was in the Soviet's interest to prolong negotiations and thus prolong the asymmetry in chemical warfare capability which favors them. We believe we can break their intransigence by making it clear we will reduce that asymmetry with our own program. Then they will have an incentive to achieve a complete and verifiable chemical weapons ban.

Before turning to Mr. Burt, I would like to address one last point. That relates to the role of our nuclear weapons forces in deterring chemical warfare against us.

I believe that we cannot rely on our nuclear posture as a credible deterrent to chemical use, since the Soviets have gained at least parity in the nuclear arena. Furthermore, barriers to nuclear weapons use I

believe should be kept as high as possible, not lowered to counter threats which we can handle in other ways. Therefore, to deter the use of chemical weapons against the United States or our allies, we must eliminate the significant advantage the Soviets would now gain by initiating such use.

I would like to turn now to Mr. Burt for his statement.

Chairman HATFIELD. Thank you very much. We will insert your prepared statement at this point in the record.

[The statement follows:]

STATEMENT OF DR. RICHARD L. WAGNER, ASSISTANT TO THE SECRETARY OF
DEFENSE (ATOMIC ENERGY)

I APPRECIATE THE OPPORTUNITY TO APPEAR BEFORE YOU IN SUPPORT OF THE ADMINISTRATION'S PROGRAM TO DETER CHEMICAL WARFARE. AS YOU MAY KNOW, SEVERAL MONTHS AGO MY OFFICE WAS DESIGNATED AS THE FOCAL POINT FOR ALL CHEMICAL MATTERS WITHIN THE DEPARTMENT OF DEFENSE. SINCE THAT TIME, WE HAVE BEEN ADDING STAFF TO DO THIS JOB. TO ASSIST ME IN CARRYING OUT THESE NEW RESPONSIBILITIES, I NOW HAVE A NEWLY APPOINTED DEPUTY FOR CHEMICAL MATTERS, DR. TED GOLD, WHO IS SUPPORTED BY A SMALL PROFESSIONAL STAFF. I ALSO CHAIR THE DOD STEERING COMMITTEE ON CHEMICAL MATTERS, CONSISTING OF REPRESENTATIVES FROM THROUGHOUT THE OFFICE OF THE SECRETARY OF DEFENSE, THE SERVICES, THE JCS, AND THE DEFENSE INTELLIGENCE AGENCY. ADDITIONALLY, IN FORMULATING OUR PROGRAM, WE HAVE BEEN WORKING CLOSELY WITH THE DEPARTMENT OF STATE, THE ARMS CONTROL AND DISARMAMENT AGENCY, AND THE NATIONAL SECURITY COUNCIL. WE HAVE RECENTLY SUBMITTED TO CONGRESS A FULL REPORT ON OUR PROGRAM TO DETER CHEMICAL WARFARE.

WITH ME TODAY IN ADDITION TO DR. GOLD ARE THE THREE SERVICE REPRESENTATIVES ON THE DOD CHEMICAL STEERING COMMITTEE--REAR ADMIRAL BRYAN W. COMPTON, JR., DIRECTOR STRIKE AND AMPHIBIOUS WARFARE DIVISION, US NAVY; BRIGADIER GENERAL JERRY TIETGE, DEPUTY DIRECTOR OF OPERATIONS, US AIR FORCE; AND COLONEL BOBBY ROBINSON, DEPUTY DIRECTOR, NUCLEAR AND CHEMICAL DIRECTORATE, US ARMY. COL ROBINSON IS REPRESENTING GEN FULWYLER, WHO IS RECOVERING FROM SURGERY. ALSO, MR. MIKE MACDONALD, OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR POLICY IS HERE. DR. GOLD AND I WILL BE PROVIDING THE RATIONALE BEHIND THE PROGRAM TO DETER CHEMICAL WARFARE AND AN OVERVIEW OF THAT PROGRAM.

I WOULD LIKE TO BEGIN WITH A SHORT REVIEW OF THE SOVIET UNION'S CAPABILITY TO WAGE CHEMICAL WARFARE AND FIGHT IN A CONTAMINATED ENVIRONMENT.

THERE ARE GAPS IN OUR KNOWLEDGE OF SOVIET CW ACTIVITIES. HOWEVER, AVAILABLE EVIDENCE INDICATES THAT OUR MAJOR ADVERSARY HAS DEVELOPED AND DEPLOYED A FORMIDABLE CAPABILITY TO WAGE CHEMICAL WARFARE. WE KNOW THE FOLLOWING:

THE SOVIET UNION HAS A MILITARY DOCTRINE THAT FORESEES THE USE OF CHEMICAL WARFARE AND ACKNOWLEDGES ITS VALUE, PARTICULARLY WHEN USED IN MASSIVE QUANTITIES AND WITH SURPRISE. THEY VIEW CHEMICAL WEAPONS AS HIGHLY EFFECTIVE AND BELIEVE THEY CAN ACHIEVE A HIGH CASUALTY RATE AGAINST PROTECTED FORCES BECAUSE OF SURPRISE AND DEFICIENCIES IN THE DEFENDER'S TRAINING AND EQUIPMENT.

THE SOVIET UNION POSSESSES A CONSIDERABLE VARIETY OF LETHAL AND NON-LETHAL CW AGENTS, INCLUDING NERVE, BLISTER, AND BLOOD TYPES. TRICHOCECENE TOXINS ARE ALSO PART OF THEIR INVENTORY, BASED ON THE FINDINGS FROM LAOS AND KAMPUCHEA.

THE SOVIET UNION HAS MANY WAYS TO DELIVER CHEMICAL AGENTS INCLUDING AERIAL BOMBS, SPRAY TANKS, TACTICAL MISSILES, ARTILLERY AND MORTAR PROJECTILES, ROCKETS, AND MINES.

THE SOVIET UNION HAS THE POTENTIAL, IN EXISTING FACILITIES, TO PRODUCE VERY LARGE QUANTITIES OF CW (AND BIOLOGICAL WARFARE (BW)) AGENTS.

THE SOVIET UNION HAS LARGE AND WELL-TRAINED CHEMICAL WARFARE FORCES IN ALL SERVICES. THESE SOVIET CHEMICAL TROOPS, COMPRISING OVER 60,000 ACTIVE PERSONNEL, ARE ONE OF FOUR SPECIALIZED BRANCHES REPORTING DIRECTLY TO THE MINISTER OF DEFENSE. THE STATUS OF THE CHEMICAL TROOPS WAS UPGRADED DURING THE 1970s.

THE SOVIET UNION HAS A LARGE AND STILL EXPANDING CHEMICAL PROVING GROUND (SHIKHANY). THERE ARE ALSO SEVERAL SUSPECTED PRODUCTION FACILITIES IN THE SOVIET UNION.

THE SOVIET UNION PROVIDES EXTENSIVE CHEMICAL PROTECTION FOR THEIR FORCES AS EVIDENCED BY THE WIDE DISTRIBUTION OF INDIVIDUAL PROTECTIVE SUITS AND FIELD SHELTERS FOR CHANGING CONTAMINATED CLOTHING AND BY OUTFITTING MILITARY VEHICLES AND SHIPS WITH FILTERS AND DECONTAMINATION KITS. IN ADDITION, FIGHTING VEHICLES SUCH AS TANKS AND ARMORED PERSONNEL CARRIERS ARE PROVIDED WITH POSITIVE PRESSURE SYSTEMS.

THE SOVIET UNION HAS INVESTED VERY HEAVILY IN CAPABILITIES TO DECONTAMINATE PERSONNEL, EQUIPMENT, AND TERRAIN. THIS CAPABILITY INCLUDES ABOUT 12,000 MODERN DECONTAMINATION AND RECONNAISSANCE VEHICLES.

THE SOVIET UNION PROVIDES INTENSIVE CW TRAINING FOR THEIR FORCES WHICH INCLUDES THE USE OF ACTUAL CHEMICAL AGENTS.

THE SOVIET UNION HAS BW RELATED FACILITIES AT SVERDLOSK, AND PERHAPS ELSEWHERE.

THE SOVIETS ARE USING, OR SPONSORING THE USE OF, CHEMICAL AGENTS AND/OR TOXINS IN SOUTHEAST ASIA AND AFGHANISTAN.

WE DO NOT KNOW VERY WELL:

THE SIZE OF THE SOVIET'S CHEMICAL MUNITIONS STOCKPILE (QUANTITATIVE ESTIMATES OF THE SOVIET STOCKPILE ARE DIFFICULT TO MAKE. HOWEVER, EVEN THE LOW ESTIMATE OF USEABLE AGENT TONS PROVIDES A SUBSTANTIAL MILITARY CAPABILITY);

WHERE THEIR CW MUNITIONS ARE DEPLOYED;

THE SIZE AND SCOPE OF THEIR CW/BW R&D EFFORT (WE DO KNOW IT IS AN ACTIVE PROGRAM AND PROBABLY INCLUDES DEVELOPMENT OF NEW AGENTS).

HOWEVER, WE CAN ASK THE QUESTION, "HAVE THE SOVIETS INVESTED SO HEAVILY IN CW CAPABILITIES SOLELY FOR DEFENSIVE PURPOSES?" PERHAPS, BUT IN VIEW OF OUR WIDELY KNOWN WEAKNESS IN THE AREA AND THE LACK OF SIGNIFICANT THREAT CW CAPABILITIES FROM OTHER NATIONS, WE BELIEVE IT UNLIKELY. RATHER, GIVEN THAT (1) THEIR DOCTRINE PROVIDES FOR CHEMICAL WEAPONS USE, (2) THEY HAVE THE LETHAL CW AGENTS AND DELIVERY MEANS, (3) THEIR TROOPS ARE THE BEST TRAINED AND EQUIPPED IN THE WORLD TO FIGHT IN A CHEMICALLY CONTAMINATED ENVIRONMENT, AND (4) THEY ARE USING AND SPONSORING THE USE OF CHEMICAL AGENTS, PRUDENCE DICTATES THAT WE MUST TAKE SERIOUSLY THEIR CAPABILITY TO WAGE OFFENSIVE CHEMICAL WARFARE.

THE 1980 DEFENSE SCIENCE BOARD STUDY ON CW REPORTED, "THE LARGE INVENTORIES OF PROTECTIVE EQUIPMENT, COMBINED WITH EXTENSIVE TRAINING IN THEIR USE AND THE TESTING OF SUCH EQUIPMENT ON A REGULAR BASIS IN SIMULATED COMBAT SITUATIONS, INDICATES THAT THE SOVIETS HAVE ATTEMPTED NOT ONLY TO PROVIDE COMPLETE PROTECTION FOR THEIR FORCES BUT ALSO TO MINIMIZE THE DEGRADATION IN FORCE EFFECTIVENESS THEY WOULD EXPERIENCE IN A CHEMICAL ENVIRONMENT. THE LATTER, OF COURSE, IS AN IMPORTANT OBJECTIVE FOR ANY OFFENSIVE, AS WELL AS DEFENSIVE CAPABILITY."

IN CONTRAST TO THE SOVIET UNION DURING MOST OF THE 1970s THE US ALLOWED ITS CHEMICAL RETALIATORY CAPABILITY TO DECLINE; DID LITTLE TO IMPROVE CHEMICAL PROTECTION; AND NEGLECTED RELEVANT TRAINING AND DOCTRINE. THE UNITED STATES HAS NOT PRODUCED LETHAL OR INCAPACITATING CHEMICAL AGENTS, TESTED OR FILLED MUNITIONS SINCE 1969. FURTHER, IN 1969, THE US UNILATERALLY RENOUNCED THE USE OF BIOLOGICAL AND TOXIN WEAPONS; AND SUBSEQUENTLY, ALL BIOLOGICAL AND TOXIN STOCKS WERE DESTROYED.

THE SOVIET UNION TODAY POSSESSES A DECISIVE MILITARY ADVANTAGE BECAUSE OF THE LARGE ASYMMETRY IN CHEMICAL CAPABILITIES. THE ADVANTAGES THEY ENJOY IN THE CONVENTIONAL ARENA ARE AMPLIFIED WHEN THE RESPECTIVE CHEMICAL CAPABILITIES ARE CONSIDERED, AND THUS THERE WOULD BE AN INCENTIVE FOR THEM TO USE CHEMICAL WEAPONS IN POTENTIAL FUTURE CONFLICTS.

THE ADMINISTRATION'S GOAL IN THE AREA OF CHEMICAL WARFARE, OR CW, IS A COMPLETE AND VERIFIABLE BAN ON THE DEVELOPMENT, PRODUCTION, AND STOCKPILING OF CHEMICAL WEAPONS. WE ARE WORKING TOWARD ATTAINING SUCH A BAN THROUGH THOROUGH AND DETAILED MULTILATERAL DISCUSSIONS AND NEGOTIATIONS IN THE COMMITTEE ON DISARMAMENT. WE MUST RECOGNIZE, OF COURSE, THAT EFFORTS TO BAN CW WILL TAKE TIME BEFORE THEY CAN SUCCEED. UNTIL SUCH A BAN CAN BE OBTAINED, OUR OBJECTIVE -- CONSISTENT WITH EXISTING TREATIES AND AND INTERNATIONAL LAW -- WILL BE TO DETER THE USE OF CHEMICAL WEAPONS BY BOTH A DEFENSIVE AND RETALIATORY CAPABILITY. IN THIS INTERVENING PERIOD, IT IS ESSENTIAL, WE BELIEVE, THAT THE UNITED STATES PURCHASE SOME SENSIBLE LEVEL OF INSURANCE AGAINST CW USE THROUGH THE MODERNIZATION PROGRAMS WE ARE NOW PROPOSING AND WHICH WE WILL DISCUSS THIS AFTERNOON.

I CANNOT OVERSTRESS THE ADMINISTRATION'S CONVICTION THAT WE NEED A PROD TO GET THE SOVIETS TO NEGOTIATE SERIOUSLY ABOUT SUCH DIFFICULT ISSUES AS CW VERIFICATION AND COMPLIANCE. IN THE PAST, BECAUSE THE US UNILATERALLY EXERCISED RESTRAINT BY DEFERRING CW MODERNIZATION, IT WAS IN THE SOVIETS' INTEREST TO PROLONG NEGOTIATIONS AND THUS PROLONG THE ASYMMETRY IN CW CAPABILITIES WHICH FAVORS THEM. WE BELIEVE WE CAN BREAK THEIR INTRANSIGENCE BY MAKING IT CLEAR THAT WE WILL REDUCE THAT ASYMMETRY WITH OUR OWN PROGRAM. THEN THEY WILL HAVE AN INCENTIVE TO ACHIEVE A COMPLETE VERIFIABLE CHEMICAL WEAPONS BAN.

AS YOU ARE AWARE, THE UNITED STATES IS PARTY TO TWO TREATIES WHICH IMPACT ON THE AREAS OF CHEMICAL AND BIOLOGICAL WARFARE. THE FIRST IS THE GENEVA PROTOCOL OF 1925 WHICH PROHIBITS THE USE IN WAR OF ASPHYXIATING, POISONOUS, OR OTHER GASES, AND OF BACTERIOLOGICAL METHODS OF WARFARE. THIS IS GENERALLY VIEWED AS A "NO FIRST USE" AGREEMENT SINCE A NUMBER OF COUNTRIES, INCLUDING THE UNITED STATES, HAVE ENTERED RESERVATIONS TO THE PROTOCOL ALLOWING CHEMICAL USE UNDER SPECIFIED CONDITIONS. IN OUR CASE, WE HAVE RESERVED THE RIGHT TO RETALIATE WITH CHEMICAL WEAPONS AGAINST ANY ENEMY STATE WHOSE ARMED FORCES OR ALLIES DO NOT OBSERVE THE PROVISIONS OF THE PROTOCOL. THE SECOND TREATY IS THE BACTERIOLOGICAL (BIOLOGICAL) AND TOXIN WEAPONS CONVENTION (BWC) WHICH PROHIBITS THE DEVELOPMENT, PRODUCTION AND STOCKPILING OF BIOLOGICAL OR TOXIN WEAPONS. TOXINS ARE PROHIBITED REGARDLESS OF THEIR ORIGIN OR METHOD OF MANUFACTURE.

CONSISTENT WITH THESE TREATIES, THE UNITED STATES WILL NOT USE CHEMICAL WEAPONS UNLESS THEY ARE FIRST USED AGAINST US OR OUR ALLIES. ALSO, THE UNITED STATES DOES NOT AND WILL NOT UNDER ANY CIRCUMSTANCES POSSESS BIOLOGICAL OR TOXIN WEAPONS.

WHILE UNILATERALLY RESTRAINING OUR CHEMICAL CAPABILITIES, THE UNITED STATES MADE MAJOR EFFORTS, IN THE LATE 70s, TO ELIMINATE THE CHEMICAL THREAT BY ATTEMPTING TO REACH AGREEMENT WITH THE SOVIETS ON A COMPREHENSIVE AND VERIFIABLE BAN ON CHEMICAL WEAPONS. VERIFICATION OF SUCH A BAN IS A COMPLEX AND DIFFICULT PROBLEM. EFFORTS STALEMATED PRINCIPALLY DUE TO FUNDAMENTAL DISAGREEMENT ON THE ESSENTIAL ISSUE OF THE NEED FOR EFFECTIVE VERIFICATION OF A CHEMICAL WEAPONS BAN AND PARTICULARLY SOVIET INTRANSIGENCE ON QUESTIONS RELATING TO ON-SITE INSPECTIONS. ON THE OTHER HAND, A TREATY WITH INADEQUATE VERIFICATION PROVISIONS IS UNACCEPTABLE TO THE UNITED STATES. NEGOTIATIONS WERE FURTHER COMPLICATED BY OUR WEAK CHEMICAL WARFARE POSTURE COMPARED TO THE SOVIETS, WHO HAD, AS I NOTED EARLIER, LITTLE ARMS CONTROL INCENTIVE IN VIEW OF THE LARGE ASYMMETRY IN CW CAPABILITIES. THE SOVIETS DID, HOWEVER, HAVE AN INTEREST IN NEGOTIATIONS AS LONG AS THEY IMPEDED IMPROVEMENT OF OUR CAPABILITIES.

THE LACK OF SUCCESS IN OBTAINING A COMPLETE VERIFIABLE CHEMICAL WEAPONS BAN LEADS TO THE INESCAPABLE CONCLUSION THAT CHEMICAL WARFARE DETERRENCE IS ESSENTIAL.

BEFORE WE DESCRIBE THIS PROGRAM, I WANT TO ADDRESS A BASIC QUESTION OFTEN RAISED REGARDING POSSIBLE RESPONSES TO THE SOVIET CW THREAT.

THE QUESTION RELATES TO THE ROLE OF OUR NUCLEAR FORCES IN DETERRING CHEMICAL WARFARE AGAINST US. I BELIEVE THAT WE CANNOT RELY ON OUR NUCLEAR POSTURE AS A CREDIBLE DETERRENT TO CHEMICAL USE SINCE THE SOVIETS HAVE GAINED AT LEAST PARITY IN THE NUCLEAR ARENA. FURTHERMORE, BARRIERS TO NUCLEAR WEAPONS USE SHOULD BE KEPT AS HIGH AS POSSIBLE; NOT LOWERED TO COUNTER THREATS WHICH CAN BE HANDLED IN OTHER WAYS. THEREFORE, TO DETER THE USE OF CHEMICAL WEAPONS AGAINST THE UNITED STATES OR OUR ALLIES, WE MUST ELIMINATE THE SIGNIFICANT ADVANTAGE THE SOVIETS WOULD NOW GAIN BY INITIATING SUCH USE.

STATEMENT OF MR. BURT

Chairman HATFIELD. Mr. Burt?

Mr. BURT. Mr. Chairman, let me begin by thanking you for your understanding about my need to leave by 3:15. I have a very brief statement—in fact, it is less than three pages—and I will read it very quickly.

Modernization of America's chemical weapons capability is a difficult and important decision which the United States has undertaken only reluctantly and after long and painstaking examination. We appreciate that the Congress, which has taken an active part in this process over the past several years, will want to continue to review each step in this program carefully.

As you know, the NATO Alliance relies on a deterrent strategy. This strategy is designed to prevent war—by that any war, at any level—by insuring that any potential aggressor must recognize that he cannot secure an advantage through the initiation of conflict at any level. Implementation of this strategy requires the Alliance to maintain a continuum of forces running from conventional small arms through strategic nuclear forces.

DETERRENT CAPABILITY IMPORTANT

NATO has long recognized that an essential part of this continuum of deterrence is an effective chemical warfare retaliatory capability. The capability which the United States has maintained in this field is explicitly designed to deter chemical warfare against the United States and its allies. American chemical weapons will never be used except in response to such a chemical attack.

The requirements of deterrence also underlie our defense posture out-

side Europe. This same retaliatory chemical weapons capability will enable the United States to deter the use of chemical weapons against our allies in other areas.

The United States has kept its allies fully informed of its decisions over the past several years to begin modernization of its chemical warfare capabilities. Last year we informed them of the administration's decision to seek funding for the facility in Pine Bluff. This year we informed them of our decision to seek funding for production. No allied government has expressed opposition to these steps.

We have informed our allies, as we have informed the Congress, that there has been no decision on forward deployment of binary chemical weapons and none is now under consideration. Given the fact that it will be several years before production begins and stockpiles are accumulated, no such consideration is likely for some time to come. We have, however, promised to consult fully with any allies concerned before any deployment decisions were made.

We have not felt it necessary, desirable, or appropriate to pose to allies hypothetical questions about how they might react to the possibility of forward deployment. No government wishes to formulate policy on issues which require no current decision. In any case, under the democratic systems of the United States and our allies, no current Western government could or would wish to bind its successors on such an issue.

COMPLETE BAN SOUGHT

Our allies, like ourselves, are committed to seeking through arms control a complete ban on the development, production, and stockpiling of chemical weapons. They have expressed this commitment to us. With the United States, they are pressing for progress toward such an agreement in the Committee on Disarmament in Geneva. They agree with us that the principal hurdle to be overcome in concluding such a ban is that of verification and the need to effectively assure compliance with a complete chemical weapons prohibition.

To date, despite several years of bilateral and multilateral discussions, the Soviet Union has proved unwilling to consider seriously, let alone accept, the sort of verification provisions which we and our allies, as well as other members of the international community, believe to be essential. This is a technically complex area; to be candid, rapid progress will be difficult. However, we believe that the absence of the U.S. modernization program will reduce the Soviet Union's incentives to move in this critical area, thus making an effective ban on chemical weapons more difficult still.

Thank you, Mr. Chairman.

Chairman HATFIELD. Thank you very much, Mr. Burt.

CONFERENCE COMMITTEE LANGUAGE

Dr. Wagner, the 1981 supplemental report carries the language of the conference committee which is as follows:

The committee directs the administration to determine the long-range costs of the chemical warfare modernization program and provide a country-by-country report from our NATO allies with respect to their official views on the long-range program.

The information provided to the committee has been insufficient in this regard. I am speaking in the past tense here.

The committee also believes it imperative that the administration provide an overview of the mission or requirements of the binary weapons as well as the arms control impact study of such requirements before further funding is approved.

I became concerned that it did not appear that we had had compliance with this request. I realize that conference report language is not necessarily legally binding or enforceable. Most generally it is carefully read and understood, and in my experience it is most generally complied with.

Because of my growing concern about this, I wrote Secretary Weinberger on February 9 of this year to reaffirm the committee's desire for this information and to further clarify the intent of the request or requirement.

Secretary Weinberger responded that deployment discussions with our allies are clearly premature, and that should it ever be determined that overseas deployment is desirable, there will be full consultation with the nations involved prior to making any decision.

Mr. Secretary, is that the status of this request to the conference committee at this time? Is this still the status, that there is no official country-by-country report that is available for this committee's consideration?

Dr. WAGNER. Yes, sir; that is the status. We, of course, have understood that we are faced with a dilemma in trying to comply with your desires and the language in the bill to be responsive to you in that way. We have talked among ourselves, clearly, and with the Department of State at length as to whether or not we could and should provide for you that rather detailed country-by-country statement or assessment.

We felt that it was not, frankly, sir, in the interest of the alliance to put our allies in a position where they had to answer what Mr. Burt quite properly, I think, sir, referred to as a hypothetical question.

We did, in our report to Congress, in response to the other strictures of your letter and the act, which we supplied in mid-March, we did provide a summary of the general features of the NATO Alliance's approach to chemical warfare, their and our desire to maintain and develop a stronger chemical posture, including a limited retaliatory capability, which is and will probably continue to be, we all understand, currently provided by the U.S. retaliatory capability.

FORWARD DEPLOYMENT

We have queried and informed the allies about our current development and production program. As Mr. Burt said, we have not received any responses from them which were negative, nor any responses which addressed the question of forward deployment, since that is some years away.

We do not believe that the deterrent value of our production of our binary weapons depends on forward deployment—I understand that that is an issue and we can go into that at some length—the ability to move weapons overseas at the beginning stages or during a war; and

therefore, since we don't believe that the deterrent capability depends—it would be strengthened to some extent certainly by a forward deployment, but we do not believe it depends crucially on a forward deployment—that therefore it was not in the best interest of the alliance to query them in detail about that future situation. I understand we have not been as responsive as you would like us to be, sir.

Chairman HATFIELD. What alternative—or options—to forward deployment do you have if the European allies are ruled out?

Dr. WAGNER. The option is to keep the weapons in this country and to deploy them to Europe in time of war when we begin to see that they are needed.

Chairman HATFIELD. You have no alternative forward deployment plan, other than for that deployment to occur on the soil of our allies?

Dr. WAGNER. Since that would be where the weapons would be needed if, in fact, they were needed, if our allies were attacked, and especially if attacked by chemical weapons, that is certainly where they would end up. However, I think the term "forward deployment" means advance deployment, deployment in advance of the time they might be used. I believe we feel that we can maintain a credible chemical retaliatory capability basing the weapons in the United States and moving them up during the war. I think that if we are to go into that in much more detail it is probably worthwhile doing it in closed session; I am sorry.

Chairman HATFIELD. All right. And do you suggest a closed session to discuss what constitutes adequacy of deterrence in terms of quantitative analysis?

Dr. WAGNER. Yes, sir; I do.

Chairman HATFIELD. Do you have any comments, Mr. Burt, to make on the language in the conference report, the supplemental 1981?

ALLIED DISCUSSIONS

Mr. BURT. Mr. Chairman, I might just make one or two brief remarks.

I think we agree with the Defense Department and with Secretary Weinberger, as he stated in his letter to you on March 5, that we believe deployment discussions with our allies are clearly premature, because as we have pointed out here today, no decision has been taken on deployment, and we do not anticipate a decision on deployment for the foreseeable future.

I might add to that that the allies do agree on our overall military strategy for defending Europe against attack, which is designed in turn, of course, to deter such an attack—a conventional, chemical, or nuclear attack—and that the Defense Department's chemical modernization program does not place any new or increased emphasis on the role of chemical weapons within that agreed strategy within the alliance, and it does not signal a change in the current retaliatory doctrine for chemical weapons.

We believe then that the modernization program is consistent with that strategy. So we do not see the need to open up or begin discus-

sions with the allies on changes in our strategy as represented in MC14/3, or the so-called strategy of flexible response, which has deterred a war in Europe and which we believe will continue to do that.

CLOSE CONSULTATION WITH ALLIES

This administration, both the Defense Department and the State Department, I think has consulted more closely with our allies on a broad range of security-related issues than any administration in recent times. In fact, early next week I will be leaving for Brussels to carry out our regular consultations on the current negotiations on intermediate-range forces in Geneva. We intend to consult closely with the allies on our approach to the START negotiations. We have also consulted more closely, I think, on the chemical weapons issue. In fact, we are now discussing with our allies and others in Geneva, on a continuous basis, a multilateral ban on chemical weapons.

The point I am making is that we have enough current issues of immediate concern before the alliance now that require consultation and cohesion that we believe it would be inappropriate and, in fact, counterproductive to carry out consultations on what we earlier described as essentially a hypothetical issue.

If and when this administration is ready to take a decision on deployment, we have told the allies that we will consult closely with them. And I think I could make a commitment to you, Mr. Chairman, that we will be prepared to report on those consultations when they are necessary.

Chairman HATFIELD. Mr. Burt, let's dissect this statement a little bit, because I think we are confusing what the request was and what the request was not. The request did not include the opinion of the allies on forward deployment. The request had to do with the views on the U.S. chemical weapons program as then projected.

ALLIES VIEW OF U.S. CHEMICAL WEAPONS PRODUCTION PROGRAM

What is now a summary statement that you would make as to your assessment of our allies in Europe's view about our chemical weapons production program as proposed by this administration? Is it affirmative? Is it supportive? Is it negative? Is it mixed? What is our allies' opinion on that?

Mr. BURT. I do not know what our allies' opinion is of that program. It is an explicit part of U.S. policy to take responsibility for what, in fact, are unilateral decisions on our part. Our decision to begin production of chemical weapons was a unilateral decision for which we take full responsibility.

Chairman HATFIELD. I appreciate that.

Mr. BURT. Our decision to deploy those weapons cannot be taken unilaterally. The responsibility for that decision must be shared.

I will only, if I could, point out what I think to be a very important historical episode, and that was the furor that was produced within the alliance over the enhanced radiation weapon, or so-called neutron bomb. In that case, there were steps taken by the previous administra-

tion to ask the allies to share with the United States in a production decision, not a deployment decision. That was, I think, a major political mistake, not only in terms of U.S. interests, but in the allies' interests as well. We believe that our defense decisions, as long as they do not influence or affect our allies, should be taken by us.

Chairman HATFIELD. In effect, you are saying that you have not complied with the request as stated in the language, to determine country by country the view of our allies on our chemical weapons program.

Mr. BURT. As I said before, we do not know their views. We have not offered their views.

Chairman HATFIELD. Even though, as Dr. Wagner says, these weapons would have to be deployed to be effective in the European theater.

Mr. BURT. We would never deploy the weapons in the European theater without consulting with our allies.

Chairman HATFIELD. Of course not. That is not my question. My question is again, these are weapons that would be manufactured and would not be effective in some kind of a depot or arsenal here, but would be a weapon utilized in a forward or advanced deployment in a time of need.

Dr. WAGNER. We believe, Senator Hatfield, that the purpose of the weapons is deterrence and that the Soviets will be deterred if they know we can or could deploy them—

Chairman HATFIELD. That is still not my question. My question is simply that these weapons, unlike many other weapons, to be effective, are required to be placed in an advanced deployed position, which would be in Europe.

Dr. WAGNER. Just before they are used, they must certainly be there where they must be used.

Chairman HATFIELD. I understand. We have not yet determined the opinion of our allies, not on the question of deployment, but on the question of cranking up this program again after Mr. Nixon's moratorium.

Mr. BURT. Mr. Chairman, we simply don't see the need or the necessity to do that at present.

OPINION OF ALLIES UNKNOWN

Chairman HATFIELD. That is perhaps correct. But that was not what the language of the report was. So you are still not in compliance with the language of the report, because you cannot tell me the opinion of the allies, country by country.

Mr. BURT. That is right. Since it is a totally hypothetical issue, they have not told us and we have not asked.

Chairman HATFIELD. I see. Thank you very much.

We have a vote on. We will recess—

Senator STEVENS. Can I ask one question? I can't come back. Just one question.

Chairman HATFIELD. Certainly.

SOVIET CAPABILITY

Senator STEVENS. In reading through your statement, Dr. Wagner, there is an implication here that the Soviets have the capability to produce biological warfare agents. Did you mean to just drop that as an implication? On page 3 you talked about their capability of developing biological agents. Do we have any evidence they are doing that?

Dr. WAGNER. Yes, sir, we do. I can simply mention two things in the open hearing. We believe that the incident in Sverdlosk in the U.S.S.R. revealed a biological warfare research and production location and capability. We believe also that the Soviets have been involved in the use of micro-toxins in Southeast Asia. The substantiating information on those two points, I think, perhaps would best be gone into in closed session.

Senator STEVENS. Thank you very much.

Chairman HATFIELD. If you will excuse us, please.

[A brief recess was taken.]

POTENTIAL TERRORIST ACTIVITY

Chairman HATFIELD. I apologize for the interruption. And now they have just called another vote, but I am going to continue and finish up, Mr. Burt, so that you can leave.

Mr. Burt, let me shift gears a moment and indicate my understanding of this weapons program. I understand that it is noted for its manufacturing simplicity. I understand it is noted also for its being easily produced, easily transported, more safe, and easily stored. Because of that greater simplicity, if these are correct assessments, have you made any assessment on the possibility of this kind of weapon proliferating, and in that proliferation becoming an alternative, perhaps, even to a nuclear weapon for terrorists?

Let's stretch the imagination for a moment. We hear about Colonel Qadhafi of Libya boasting about creating an Islamic bomb. We know the kind of irresponsible leadership we have had in countries like Uganda under Idi Amin. Could this become a more easily acquired weapon for such countries? And what has the State Department done in the assessment, say, of the possibility of this kind of weapon either becoming an alternative to nuclear weapons or of gaining easy access for such countries in the Third World or elsewhere, which have evidences of instability, terrorists tactics, et cetera?

Mr. BURT. Mr. Chairman, that is a good question. I can't report to you what work or analysis is now underway in the State Department on this question. And I think, perhaps, you might ask whether this issue is being examined or has been examined in the Arms Control and Disarmament Agency.

I can report to you that in an earlier incarnation, when I was the Assistant Director of the International Institute for Strategic Studies in London, that there was some analysis of this problem done, not only by the Institute but, I think, some private individuals who were doing contract research for the U.S. Government. And on that, I think some general observations were made.

GENERAL OBSERVATIONS

One is that this is a capability that has been in existence for some time; that is, chemical weapons capabilities. Of course, they were used in World War I. They were not the major cause of fatalities, of course, in World War I. Conventional arms were.

I think we often forget how awesome destruction can be in conventional conflicts, with 55 million people killed in World War II, but that there are ways or means, say, of mass destruction that are available to terrorists. Biological weapons are probably the most effective, possibly the easiest to disseminate—the kind of scenario where a terrorist group would simply put toxic materials in the water supply of a major city or dispense them through the air. I think there are a number of scenarios that people have examined.

I would tend to think—and this is only a personal observation—that while the binary munitions are more simple, say, than their predecessors—again I am not even sure that is true; I would have to get the technical judgment of the Department of Defense on that—that they are in relative terms, still fairly sophisticated weapons and that most terrorist groups would, if they were interested in the kind of massive show of terrorism using weapons of mass destruction, that there would be easier ways to go about it.

TERRORISM AND MASS DESTRUCTION STUDY

I will just make one last comment, as it is an interesting issue. I know that Roberta Wuhlfstedler, Albert Wuhlfstedler's wife, and a respected analyst in her own right, has done a study looking at terrorism and mass destruction—nuclear weapons, chemical weapons, and the like. One interesting conclusion was that, given the availability of means of killing large numbers of people in large urban areas, it is indeed interesting that terrorists have not adopted that approach. God forbid, at least they haven't adopted it until this date. So far their targets have been rather selective and their use of weapons somewhat discriminate.

Chairman HATFIELD. Mr. Burt, it seems to me that under any general assessment of the situation today vis-a-vis the nuclear weapon programs, that the proliferation of nuclear material, weaponry, in the world today is out of control. I don't think we can really claim that there is a serious control system that is applicable or is operative. And it would appear to me that with the potential deadly character of this type of weapon program that it would behoove the agency of State or Defense, or perhaps a combination, to make some kind of assessment and judgment on this question before we launch into a major production.

In less than two decades from now, we are told that some 60 countries of the world will have the capability of producing some kind of a nuclear weapon. My concern for the future in nuclear weaponry is as much related to the non-super powers as to the super powers and less the restraint upon some of those countries that will have that capability, more than we have even as the super powers. That is why I am very concerned about how we assess this weapons program before we get into that kind of production.

Mr. BURT. Could I make one observation on that question?

Chairman HATFIELD. Sure.

Mr. BURT. I agree on the need in principle to think about the so-called problem of horizontal proliferation as well as the vertical problem. I think I would only add that we have to recognize that our military capabilities, and the credibility of our own deterrent capabilities across the board, oftentimes have an important impact on decisions other countries make about acquiring weapons.

Some of the countries that have or some of the countries that could acquire nuclear weapons could base part of that decision on their evaluation of the credibility of American deterrence.

One simple example, of course, was Charles DeGaulle who, in the 1960's, argued that France should have its own independent nuclear capability because the United States could not be relied on in a time of crisis to take risks for the rest of Europe, specifically France.

So by definition, I don't think it is always clearcut that the deployment by the United States of a weapon increases the risks of proliferation. If that weapon enhances our deterrent capability, I think it can in certain cases also decrease incentives for countries to acquire their own arms.

CIA MEMORANDUM

Chairman HATFIELD. I can appreciate that. Are you aware of the CIA memorandum on this matter that was issued as a classified document in 1980? It raised some very disturbing questions about the terrorist use of chemical weaponry? If you aren't, I would urge you to get a copy.

Mr. BURT. I have read that.

Chairman HATFIELD. You have read that. That is somewhat the base upon which I raise the question now. It is incredible to me that we have apparently given so little attention to this question. Perhaps in the closed session we could discuss it with greater clarity.

I will now excuse you to keep your appointment. And if the other gentlemen would just be tolerant a little bit longer, I will go vote and come back.

Mr. BURT. Thank you, Mr. Chairman.

Chairman HATFIELD. Thank you.

Senator PRYOR. Mr. Chairman?

Chairman HATFIELD. Excuse me. I didn't realize you were here.

Senator PRYOR. I have already voted.

Chairman HATFIELD. Then we will not recess. We will continue.

Senator Pryor, I had made a commitment to Mr. Burt to let him be excused by 3:15. But Mr. Wagner, you have heard his testimony, if you would like to proceed with Mr. Wagner, or should we go back and start the testimony now with Dr. Gold?

Dr. WAGNER. It might be useful to go to Mr. Busby. Mr. Busby, I believe, was scheduled first.

Chairman HATFIELD. Let's start then with that, and you can carry on.

Senator PRYOR. Thank you very much, Mr. Chairman.

If you would like, you may proceed. Do you have a statement for the record?

PREPARED STATEMENT AND BIOGRAPHICAL SKETCH

Mr. BUSBY. Thank you, Senator. I do have a statement, but with your permission, I will simply submit it for the record and perhaps make a few general comments on matters of most important concern to the committee.

Senator PRYOR. Fine.

[The statement and biographical sketch follow:]

STATEMENT OF MORRIS BUSBY, DEPUTY U.S. REPRESENTATIVE TO THE
COMMITTEE ON DISARMAMENT

Thank you Mr. Chairman. I am pleased to appear today to discuss ongoing arms control negotiations on chemical weapons.

A major arms control objective of the United States is the achievement of a complete and verifiable ban on the development, production, and stockpiling of chemical weapons. This is a long-standing goal which has been reaffirmed recently at the highest levels of the government. I would stress that we are seeking to eliminate a real threat, by removing real weapons from existing arsenals of potential adversaries. An effective prohibition of chemical weapons is a means for increasing U.S. security, the security of our friends and allies, as well as the security of neutral/non-aligned countries who have no defense against these weapons.

The United States is now Party to two treaties constraining chemical weapons, the 1925 Geneva Protocol and the 1972 Biological and Toxin Weapons Convention. The 1925 Geneva Protocol bans the use of chemical and biological weapons but not the possession of such weapons. Since many Parties, including the United States, have reserved the right to retaliate in kind if attacked with such weapons, the Protocol has in practice become a ban on first use. As a result, large stockpiles of chemical weapons exist today in national arsenals. The 1972 Biological and Toxin Weapons Convention supplements the prohibition on use in the earlier treaty; it bans the development, production, stockpiling and acquisition of biological and toxin weapons and requires destruction of existing stocks. This Treaty also contains an obligation "to continue negotiations" to conclude a complete ban on chemical weapons.

Following the entry into force of the Biological and Toxin Weapons Convention, the United States and the Soviet Union initiated in 1977 formal bilateral negotiations to develop a joint initiative which could serve as the basis for multilateral

elaboration of a chemical weapons convention. Altogether there have been 12 rounds of bilateral discussions, the most recent in July, 1980.

In the bilateral negotiations substantial progress was made on most of the issues relating to the scope of the convention. The two sides also agreed that a convention should contain an obligation that states would not transfer the means for chemical warfare, whether directly or indirectly, to anyone. Nor would states assist, encourage or induce others to carry out activities prohibited by the convention.

However, major differences relating to the most fundamental and essential elements for a chemical weapons convention -- verification and compliance -- were not resolved. Although there was general agreement on some routine matters, little real progress was made in this area after early 1979, and the negotiations became deadlocked. The principal obstacle was Soviet rejection of United States proposals for effective international verification arrangements. Instead they advocated an approach which amounted to self-inspection. In late 1979, as the difficulties in the bilateral negotiations became increasingly apparent, the Committee on Disarmament, a 40-nation multilateral negotiating body, established an ad hoc working group on chemical weapons. That group has become the focal point for our efforts to achieve a chemical weapons ban.

Initially the group sought to identify and define issues to be dealt with in the subsequent negotiation of a multilateral chemical weapons convention. Two years later, at the beginning of this year's session, the Group's mandate was broadened and it began elaboration of a convention. The United States strongly supported this step.

In the Committee on Disarmament we have strongly advocated that the principal focus of the Group's work should be verification and compliance issues. And there is general recognition that meaningful progress is dependent on resolution of the major

differences which exist on the question of how to ensure adequate and effective verification of compliance with the Treaty. The Group has just begun its consideration of the issues under its new mandate and it is too early to make an assessment of likely progress.

Evidence that the Soviet Union and some of its allies are in violation of existing treaties and related rules of customary international law relating to chemical weapons, emphasize the necessity of ensuring that a CW prohibition, or any other arms control agreement for that matter, is effectively verifiable. This evidence has also demonstrated the need to take all steps necessary to strengthen existing constraints.

I wish I could predict when a complete and verifiable ban on chemical weapons will be achieved. In view of the slow progress in recent years and the serious problems which remain to be overcome, it is likely to require a number of years. Some have suggested that one of the most effective ways to achieve rapid progress would be for the U.S. to resume bilateral negotiations with the Soviet Union. That possibility remains open, pending a demonstration by the Soviets of a genuine readiness to abide by their international obligations and to negotiate effective verification and compliance arrangements.

It is legitimate to question whether our decision to produce binaries has had a detrimental effect on efforts to negotiate a ban on these weapons. In our judgment it has not. While some may publically deplore our decision as an escalation of the situation, most realize that it would be irresponsible not to maintain our deterrent capability and to counter the Soviet threat. And while I would agree that resuming production of chemical weapons is not a chip to be used at the negotiating table, I do believe that, only by demonstrating firm resolve can we impress upon the Soviets our seriousness regarding the absolute necessity of effective verification provisions.

In closing, I would like to emphasize that the United States is firmly committed to the achievement of a complete and effective prohibition of the possession and use of chemical and biological weapons. We intend to take steps to strengthen existing constraints and to develop effective new ones. To this end United States representatives at the Committee on Disarmament will continue to participate actively in efforts to elaborate a chemical weapons convention and will seek creative and imaginative ways to overcome the complex and difficult problems that remain.

BIOGRAPHICAL SKETCH

M. D. BUSBY is a native of Huntington, West Virginia, and graduated from Marshall University in that city. He entered the Navy through the OCS program and was commissioned an Ensign in October 1960. During his Naval career he served aboard a variety of ships and was Commanding Officer of the coastal mine sweeper MEADOWLARK. He earned a number of personal awards, including a Bronze star for combat operations in Vietnam.

Mr. BUSBY is a graduate of the U.S. Naval War College and holds a Masters Degree in International Affairs from the George Washington University.

Mr. BUSBY joined the Foreign Service in 1975. In the Department of State he has served as Director of the Office of Ocean and Polar Affairs, as Deputy Assistant Secretary for Oceans Affairs, and as Chief U.S. Fisheries negotiator with the personal rank of Ambassador. He joined the U.S. Arms Control and Disarmament Agency in September of 1981 and since that time has been the Deputy U.S. Representative to the Committee on Disarmament in Geneva, Switzerland.

TOTAL BAN GOAL OF UNITED STATES

Mr. BUSBY. Senator Pryor, the stated goal of the United States is to seek a total ban on chemical weapons, which is both effective—

Senator PRYOR. Would you please speak into the mike a little closer. Thank you.

Mr. BUSBY. The stated goal of the United States is to achieve a total ban on chemical weapons which is both effective and verifiable. The Arms Control and Disarmament Agency is charged with the responsibility for achieving that ban.

At present, the United States is party to two conventions relating to chemical weapons. As stated by Mr. Wagner earlier, those are the 1925 Geneva Protocol and the Biological and Toxin Weapons Convention of 1972.

The Geneva Protocol prohibits the use of chemical weapons. Because a number of reservations were entered to that treaty whereby States reserve the right to retaliate in kind if attacked by chemical weapons, it has in practice become, in fact, a convention which prohibits the first

use of chemical weapons. Also, under the terms of the convention the stockpiling of chemical weapons is allowed. So there are stockpiles of chemical weapons in the world today.

The Biological and Toxin Weapons Convention, on the other hand, contains a complete prohibition on biological and toxin weapons. The Biological Weapons Convention also contains a provision calling for a continuation of negotiations to achieve a complete ban on chemical weapons. Since 1976, the United States has been seeking to achieve this goal.

We negotiated first bilaterally with the Soviet Union. Those talks made a considerable amount of progress on certain aspects of the future convention. But eventually they broke down on the issues of verification and compliance. Largely they broke down because of Soviet unwillingness to consider seriously U.S. proposals for what we considered to be essential international verification procedures.

WORKING GROUP ON CHEMICAL WEAPONS

In 1979, in recognition of the difficulties we were having in the bilateral discussions with the Soviet Union, the Committee on Disarmament, a multilateral 40-nation disarmament negotiating body in Geneva, established a working group on chemical weapons. Since the establishment of that group, the focus of our efforts to try and achieve a ban on chemical weapons has been there.

We have made some progress in the CD, but again we have run into difficulties with the Soviet Union in trying to get serious discussions going on the questions of verification and compliance.

The administration believes that if we are to have a complete ban on chemical weapons, there must be effective verification provisions. If we are to give up our own capabilities for chemical warfare, we must be absolutely assured that any potential adversary has done likewise, and that we will not be attacked with chemical weapons.

There is, I believe, a legitimate question as to whether the program to resume production of chemical weapons has had a detrimental effect on the negotiations. In our judgment, it has not.

EFFECT OF PRODUCTION OF CHEMICAL WEAPONS

In this regard, there are three areas I might comment on. One is the effect of the program on our allies, particularly our European allies. I can tell you that in the Committee on Disarmament, allied unity has not been affected by our announcement to resume CW production. On the contrary, some of our allies have been up front in trying to counter some Soviet arguments which have been made that the existence of binary weapons would make the verification task difficult.

A second concern is the effect on the neutral and nonaligned countries, all of whom we would hope to sign onto a future convention. I would have to say that, by and large, most nonaligned members of the Committee on Disarmament are not particularly happy with our decision. I don't believe they would be happy with any decision to produce weapons for which they have no defenses. But at the same time I would

say that I think there is widespread understanding of the reasons for our action, and a broad measure of support for our position on the questions of verification and compliance.

PRODUCTION OF BINARIES AS BARGAINING CHIP

As to the effect on the Soviet Union, Senator, I would have to agree with those who say that production of binaries is not really a bargaining chip in the negotiations.

Senator PRYOR. It is not a bargaining chip?

Mr. BUSBY. It is not a bargaining chip per se in the sense that you can take this decision and trade it off for something in the negotiations. But I would agree in general terms with the statement made by Mr. Wagner, that a demonstration of firm resolve on this particular issue can only have a salutary effect on the attitude of the Soviet Union. In my opinion, such resolve will, in the long term, benefit the negotiations.

Finally, I would simply say that we are committed to seeking a complete ban on chemical weapons. Our ultimate goal is to get a prohibition of these weapons. We want to do it in a way that we can be assured they are, in fact, prohibited. I can't predict how long the negotiations will take. They have taken a long time already. It is a very complex and difficult area. I cannot project what the attitude of our major adversary in the negotiations will be. We are continuing to work toward a ban. We are taking a very active part in the negotiations. We are making some progress.

Senator PRYOR. Mr. Busby, if I may ask a couple of questions, and I thank you for your statement, you are dealing with the Soviets and others in these negotiations on a continuing basis. Let's assume that we appropriate x billions of dollars for a new generation of chemical warfare, more specifically binary. What is the Soviet response at that time? What are they going to do?

Mr. BUSBY. There are two aspects to that question. One is what will they do militarily. That is not a question which I feel qualified to answer. Probably the representatives of the Department of Defense can comment.

Second is what will they do in a negotiating sense. As I said, I don't believe that our decision can have anything but a sobering effect on the Soviets, since they will realize we are not prepared to unilaterally give up our deterrent capability.

POSITION OF SAUL HORMATS

Senator PRYOR. This is contrary, I think, to a belief, or at least a position that I took yesterday to be the position of Mr. Saul Hormats, who is one of the great authorities on chemical warfare. He was one of those individuals who worked earlier in our chemical warfare program and is certainly an authority.

I will read back a question that I asked him yesterday. "Do you feel, Mr. Hormats, as Admiral Davies feels"—he had just testified—"that our going into the production of a new generation of nerve gas or chemical weaponry will frighten or not frighten the Soviets?"

Mr. Hormats.. "If I were a Soviet general, I would be very pleased with that program. It would not frighten them." Then he goes on to give his reason. You believe it would frighten them; he believes it does not.

Mr. BUSBY. I am sorry, Senator. I don't believe it will frighten them.

Senator PRYOR. Why would it have a sobering effect?

Mr. BUSBY. Let me put it another way. I think so long as the United States has made a unilateral decision not to produce chemical weapons, we are, by that decision, gradually giving up our deterrent capability. There is then a question as to why is it in the Soviet's interest to negotiate? Why should they unilaterally give up their own capability?

On the other hand, faced with a situation where they do not have an advantage, maybe they will see it as in their interest to do away with the weapons. That is the way we see it and we hope they will see it the same way.

Senator PRYOR. Will the Soviets feel that it is the United States true and sincere position as we come asking the Congress to appropriate billions of dollars for chemical warfare, will the Soviets look at that as hypocrisy? Will they look at this really as a cosmetic treatment of a very serious problem, or will they say that this is going to set the negotiations back?

Mr. BUSBY. My own opinion, Senator, on that question, is that they will wait a while to see whether we are serious or not. We have made some serious proposals in the Committee on Disarmament. We have repeatedly said that if they will sit down and begin to seriously discuss the verification problem on both a technical and political basis, we are prepared and anxious to do so as well. We have not had a response as yet.

Senator PRYOR. Thank you, Mr. Busby.

I would like, if I might now, to turn to a question while the chairman is out of the room momentarily. I think we have one or two more statements to be entered in the record.

Dr. WAGNER. Dr. Gold is going to describe the program.

Senator PRYOR. If I could, before that—I am going to be a little sneaky here. I am not a member of the committee. When these Appropriation Committee members come into the room, I always have to scoot way down here. So I am going to take advantage of this particular moment that I have to ask a couple of questions, if I might, and then we will turn it back over to Chairman Hatfield as he comes in.

But my question to you, Dr. Wagner, is basically we went through last fall a great debate and great fight on the MX missile program. That was a program developed with billions of dollars spent, asking for billions of additional dollars. The basic issue there in the MX program was maybe not whether we needed additional missile capacity, et cetera; the real basic issue boiled down to where was the MX going to be deployed? How would it be deployed? Where would it be? Neither the Congress nor the White House nor the Pentagon could ever arrive at a consensus. So, as a matter of fact, the MX missile program has been temporarily shelved because that definitive method of deployment has never come forward.

PROBLEM OF DEPLOYMENT

Now we are faced with a similar situation with binary nerve gas. We don't know where to put it. We don't know where to store it. We don't know what to do with it. We don't know who is going to accept it on their soil. Mr. Burt just a moment ago said the reason we had not basically followed the mandate of the Congress in the committee language some time back in attempting to obtain from our allies which would accept it, which would not, what their feelings were about our program, et cetera.

Well, I don't know if the word was used by you or by Director Burt, but it appeared to me we didn't want to embarrass the allies by putting them in this position. Well, my question is this. I am embarrassed and I think many Members of the House and Senate are embarrassed when we are appropriating billions of dollars, once again for a program for nuclear weaponry, where we don't know what to do with it, we don't know how to deploy it. What is our answer when our constituencies basically ask us that question?

Dr. WAGNER. Senator Pryor, that is a long question.

Senator PRYOR. It just deserves a short answer, though. [Laughter.]

Dr. WAGNER. Sorry. I think that the analogy with MX is not a particularly good one. The issue there was a survivability question, not so much a geographical question. I think that there is not much similarity with the MX.

But you have asked a different question starting from that point, which is, Do we know what to do with the binary weapons, and in particular back I think more directly to the point, is it necessary to deploy them in Europe during peacetime in order for them to have the deterrent effect that we believe they will have? Is that a fair way to rephrase your question?

Senator PRYOR. I think that would be partially fair. I think that we need to know what we are going to do with binary nerve gas.

Dr. WAGNER. With regard to the deployment issue—and I think it may have been before you came in; let me go back over it again—we believe that most of the deterrent value of an offensive capability, whether binary or not, can be realized without having to deploy the weapons in Europe in peacetime; rather, having an ability to take them overseas during war along with thousands, perhaps millions of tons of other equipment that we will take.

Senator PRYOR. Doesn't that defeat your argument for deterrence? Why would it be a deterrent to the Soviets, in Europe, if the nerve gas that was going to be used against them was stockpiled in Omaha, Nebr., or wherever?

LIFT CAPABILITY REQUIREMENT

Dr. WAGNER. Most of the equipment that we would need to fight conventional war, even without chemicals, in Europe, would have to be brought from the United States after the first few days. So there is a requirement for a large lift capability.

The chemical weapons represent a small fraction of that lift capability. We believe that even based during peacetime in this country that the Soviets will recognize that we can get them there in time to be useful during war and be adequately deterred.

I would not say that that is, from the military point of view, the ideal situation. It might be somewhat better to have them in fact forward deployment. I believe, to give a flavor to it, I think you get 90 percent of the deterrent value, if they are based here, with adequate capability to get them there in time after the Soviets start a war or use chemical weapons during a war. I believe we can go into those numbers, those capabilities, in somewhat more detail during a closed session.

Senator PRYOR. Do you truthfully, sincerely believe that the present stockpile that we have of chemical warfare is as efficient, let's say, a deterrent as a new generation of binary nerve gas?

Dr. WAGNER. I do not believe that the present stockpile will represent as good a deterrent.

Senator PRYOR. You know, there is one point, or two points actually, where I agree with those proponents of binary, and that is I do believe it is safer to manufacture, it is safer to transport. But yet, with the tremendous stockpile of chemical warfare agents we have on hand today and stockpiled all around, everywhere, I for the life of me cannot see in weighing the balances why a binary nerve gas generation is going to be that much better, with those two exceptions.

Dr. WAGNER. Senator Pryor, we are prepared in closed session to go through in detail for you the composition of the current stockpile, why we believe most of it is not usable today, why we believe some which is usable today will not be usable in the future, and why we believe we need to replace and augment that small amount that may be usable in the future with a new production, which we believe should be binaries. But the numbers, the details of those statements, I think we should best deal with in closed session.

Senator PRYOR. If the stockpile has in some way become obsolete or has been subject to deterioration, why is it that the Pentagon has not come forward in the past 5 or 6 years to bring our defensive capability upward and to make it stronger? Why is it just all of a sudden now we are recognizing we have to do something to get some defensive capabilities on board?

Dr. WAGNER. We have over the past few years been increasing, with the cooperation of Congress, our capabilities in the defensive area.

Senator PRYOR. At an inch-worm pace.

Dr. WAGNER. It has not been going as fast as we believe it should go. And the bulk of the program, the bulk of the funding we are requesting will, in fact, go to protective capabilities. So there has been some improvement over the last few years. We believe that much more is needed. And that is what the bulk of our program is. We can go into that in more detail, if you would like.

Senator Pryor, I believe many of the points you are digging into here are going to be addressed by Dr. Gold in a fairly comprehensive way.

Senator PRYOR. Mr. Chairman, Mr. Busby has given his statement. I have just been asking a few questions to Dr. Wagner. I think Dr. Gold has a statement. Senator Bumpers has not asked any questions yet. So I turn it back to you.

Chairman HATFIELD [presiding]. Thank you, Senator Pryor.

I wonder if we could continue and get all the formal statements out of the way and then get to the questions. Dr. Gold?

STATEMENT OF MR. GOLD HIGHLIGHTED

Dr. GOLD. Thank you, Mr. Chairman. I have a prepared statement which has been submitted for the record. What I would like to do is highlight what I consider to be the key technical issues before us today.

I think the fundamental technical issue and the one that you rightly addressed in your opening statement regards the adequacy of the stockpile. I think there is generally agreement on most of the other points of the program.

There is agreement on the need to eliminate the threat of chemical warfare. There is agreement that the best way to accomplish that would be a complete and comprehensive ban. There is agreement that improved protection against chemical weapons is a very vital part of a program. There is further agreement that improved protection, however, alone is insufficient to deny the initiator of chemical warfare advantages on the battlefield; therefore, some retaliatory capability is needed. I think the remaining issue, and a very fair and legitimate question is, Why isn't our current stockpile sufficient for that task? I will try to go into as much of that in the open session as possible, and we can go into more detail in the closed session.

What I would like to do first is just take a minute or two to summarize the answer to the question which naturally precedes that. I don't think there is any controversy about it, but I would like to submit the answer for the record. Why can't we rely on protective measures alone to deny the initiator of chemical warfare advantages on the battlefield? Surely if we could do that, that would be the preferred way to go.

PERFORMANCE DEGRADATION

However, we can't, and the reason for that is that the measures taken to protect yourself on the battlefield cause degradation of performance. That is unavoidable. That performance degradation is caused by the equipment itself: The heat load caused by suiting up, the impairment of vision caused by wearing the mask, the loss of dexterity caused by wearing gloves, loss of maneuverability caused by wearing bulky boots, increased problems with communication caused by everybody wearing masks and hoods. In addition to performance decrements on an individual caused by wearing the protective equipment, there is also a significant penalty for units having to operate in a contaminated environment. There are decontamination procedures which require considerable time and effort which must be done. There are movement delays if you try to avoid the decontaminated areas. There is the treatment of casualties. There is the extra burden of logistics of supplying all the needed protective equipment.

It is very, very clear to me that a force which is able to fight unencumbered by protective equipment in a clean environment has a decisive military advantage over a force which is forced to operate in protective equipment and handle all the problems of a contaminated environment. That is a very unfair situation, and it would lead the side that had that advantage to think of how he might use that significant military advantage. Therefore, a retaliatory capability is an essential part of a program to deter the use of chemical weapons.

SUFFICIENCY OF CHEMICAL STOCKPILE

That leads us to what I believe is the crucial issue: Why isn't what we have today sufficient to do that? Let me use a chart for a few minutes. And again, in the open session, all I can talk about are percentages. In the closed session we can actually get into numbers of munitions.

As has been said a number of times today, only a small part of our chemical stockpile is useful from a military standpoint. If all our agent we had today was in military useful form, I don't think we would be up before you today asking for funds for the binary program.

Let me start with the left and go through the bar chart. Over 70 percent of the agent in the stockpile is not deliverable today. About 3 percent is in munitions which are not repairable. Another 8 percent is in obsolete rockets for which the launchers no longer exist. About 61 percent of the agent is stored in bulk containers for which munitions don't exist. That leaves about 28 percent of the stockpile which is either in the repairable condition or it is ready for issue. If all of that agent was in munition that was militarily useful, I don't think we would be in front of you today asking now for funding. However, the bulk of that 28 percent is not or will not be militarily useful in the near future.

Some of the munition are associated with delivery systems that are going out of the inventory. That includes 105mm howitzers and 4.2-inch mortars. Others are in munitions whose delivery tactics make them very ineffective on a battlefield. Of particular concern is the aerial spray tank that makes the delivering aircraft extremely vulnerable to modern air defenses. The rest of those munitions are in land mines and mustard artillery projectiles, which have minimal effectiveness on the battlefield. That leaves less than 10 percent of our current stockpile in what we will call potentially usable form.

The most significant and the most important lack of the stockpile is the inability to attack targets outside of artillery range with persistent agents. Therefore, we do not have the capability today to force the Soviets to operate in depth—that is, his airfields, his supply nodes, his command and control centers—under the same degraded and contaminated environment that he has the ability to force on us. The No. 1 deficiency in our stockpile today is the lack of a persistent agent capability that we can deliver beyond artillery range.

ADDITIONAL STOCKPILE PROBLEMS

There are some other problems with the stockpile. We don't have a capability to deliver from naval ships. There is also a question about the deterioration of the stockpile which has not affected the utility today but does pose some concerns for the future. We can get into that later. Finally, there is the extra burden of insuring that the unitary stockpiles are safe during handling and transport.

Let me briefly turn to a description of our program. From what I have said, our program naturally divides into two components. The bulk of our resources in the past, today and in the foreseeable future will go toward improving our protection against chemical weapons. Of the moneys we are asking for in fiscal 1983, 72 percent is to improve the protection of our forces against chemicals.

THREE MAJOR COMPONENTS OF PROGRAM

The protective part of our program has three major elements to it. First, and perhaps foremost, we must continue to implement training and we must continue to develop relevant doctrine. Senator Pryor said that progress has been at a snail's pace in this area.

Senator PRYOR. In defensives.

Mr. GOLD. I am talking about the defensive area. The progress is not nearly as much as we wanted, but it is certainly not at a snail's pace. I think there has been remarkable improvement over the last several years, and in no other area is that shown more than in training.

There has been a tremendous acceptance and recognition that more and better training is a vital part of our program, and increased and better training has been instituted both on the individual level, both basic and advanced training, and equally important for the units in the field. I think that is probably the single most important thing we have accomplished over the last several years in trying to upgrade our capability to operate against a chemical threat.

Another area where we have made significant improvement in the last few years is the distribution of individual protective equipment. We now have adequate supplies of individual protective equipment in the field, particularly with our soldiers and airmen, though I would agree there is still a very long way to go. There are still very serious deficiencies in almost all the other aspects of protective equipment. That includes collective protection, detection and warning, decontamination, and the whole area of medical.

One element of our defensive program is training and doctrine. The second element of our defensive program is to insure that we can procure and distribute protective equipment to our troops. The third element of our program is a very vigorous research and development activity, not only so that we can develop the improved equipment that we need to minimize the degradation of performance on the battlefield but also so we can guard against technological surprise.

Again, the largest part by far of our program is the defensive aspects of it. It will continue to account for two-thirds of our resources. I just wish it could occupy two-thirds of my own time. However, with the con-

trovery over the binary program, we have 10 percent of our budget request occupying most of the time of our office and other offices involved with the program. We put the very highest priority to the defensive area, and we will spare no effort to insure that our troops can fight at least as well as the Soviet Union can on the chemical battlefield.

RETALIATORY CAPABILITY

That brings us to the second major element of our program, and that is the retaliatory, to insure that we have the capability, and the Soviets know we do, to force them to also operate in a contaminated environment with protective equipment should they initiate the use of chemical weapons.

That program also has two elements to it. The first is to upgrade our maintenance of our existing stockpile, to try to get as much utility as we can out of our existing stockpile. That is particularly focused on the munitions in the yellow portion of the chart where we have increased our maintenance in the last several years. We are upgrading the readiness of these munitions and we are even making the aerial spray tank, which is a very undesirable way to deliver weapons compatible with additional aircraft so we would at least have some interim capability to deliver a persistent agent to deeper targets.

This maintenance program is an important part of our overall retaliatory. But the maintenance program will not redress the quantitative and qualitative deficiencies in the current stockpile. It will not give us enough munitions to cover what we think is an adequate number—and we can get into the numbers later—and it will not redress the qualitative deficiencies of the stockpile. It will not give us the capability to hit targets beyond artillery range with persistent agents. It will not give us a capability to operate from carriers.

DEMILITARIZATION PROBLEM

Finally, there is a third element of the program, a very important and difficult one in its own right, one which is probably deserving of much more attention than we can give here today—and I would be happy to come back and discuss that another time—and that is the problem of disposing of our current stockpile, the so-called demilitarization problem. Eventually we are going to dispose of the entire stockpile. Estimates of the costs of that are as high as \$4 billion, based on current technology.

We are in the process of initiating a very vigorous research and development program to see if we can significantly cut these costs. We face this demilitarization problem even if we do not proceed with the binary program or with arms control. The binary production will not add to that problem because you don't make the lethal nerve agent until the weapon is on the way to the target. So one advantage of going ahead with the binaries is, at the very least, we will not be adding to this very formidable problem of disposing of the stockpile.

Before concluding my remarks, let me briefly address—

Chairman HATFIELD. But it has a shorter lifetime than the present stockpile, Dr. Meselson was saying yesterday.

Mr. GOLD. I don't think we agree to that. We can get into that a little later.

Let me address some of the issues that have been specifically raised against the binary program. As I said before, I think there is agreement on the other elements of the program—the need to deter, the need to put most of the resources into the protective side, but also the recognition that that alone is not enough. Therefore, we need a retaliatory capability. Also, the need to maintain the stockpile, the need to demilitarize the existing stockpile. I don't see that, at least in the fundamental sense, as much of a controversial issue. The issue really is, why must we go ahead with the binary program?

ARTILLERY FIRE

One of the objections raised was that in order to be effective, only 5 percent of artillery fire need be chemical to achieve our goals on the battlefield and, therefore, we don't need any more artillery projectiles. Let me first say again that the critical deficiency in our current stockpile is the lack of a persistent agent delivery capability beyond artillery range. So arguments over the number of artillery rounds have no bearing on the need to improve that deficiency.

The judgment of our military is that a few times 5 percent is a much more appropriate number in terms of an effective mix of conventional and chemical weapons to provide maximum problems and damage to the enemy. One way at least to get a feel for that—and I am not offering this as an on-the-spot analysis—is that at the very least to insure that he remains buttoned up all the time and has to face a continuing contamination problem is that every time we fire an artillery barrage, we want to have a chemical weapon in it.

Well, there are six guns in a battery. So one out of six would be a reasonable number to assume as a use of chemical weapons that would force them into protective posture, keep them into protective posture, and force them to handle whatever contamination problems. You add to that some occasional all-chemical rounds and you come out with a number that is several times the 5 percent as a reasonable number for the chemical mix in artillery.

The question of whether there is any deterrence value unless munitions are forward deployed, I think Dr. Wagner has handled that. I fully agree that you buy the great bulk of what deterrence there is by having a credible stockpile. The implementation of development and procurement takes years. Deployment takes days. So I believe having a credible stockpile in the United States—one can argue whether it is 90 percent of the deterrence provided by an optimally deployed stockpile or 80 percent—is far better than not having a credible stockpile at all, and there is a significant deterrent value in it.

AGENT DETERIORATION

Another objection raised is that the current stockpile is not deteriorating. The facts we have indicate that there is agent deterioration going on. The current rounds that we consider to be potentially useful—the 155mm and 8 inch—have not undergone deterioration to the point where those rounds are not militarily useful. However, the deterioration does at the very least raise some concerns about the long-term future health of the stockpile. Again, we are prepared to go into that at some depth.

The criticism has been leveled that binary munitions will not be reliable because they have not been field tested and, therefore, we cannot rely on them as a confident weapon. Yesterday Professor Meselson quoted from a report done for the Army which indicated that there was no confidence in the weapon that did not have full field testing. I think that one statement was taken out of context of a larger conclusion which I would like to spend a minute reading to you, which I think gives a more balanced view of why we have a great deal of confidence that the binary rounds will be a reliable weapon.

In 1974, the Army set up a panel to look at the question of simulant testing for the binary rounds, and they came up with the following conclusions:

Tests with simulants have established with adequate certainty that with mixing, enhanced binary GB action should occur. The panel has not conceived any factors which would alter this conclusion.

The simulant approach that is being implemented will collectively provide a reasonable estimate of the dissemination characteristics of the round. All desirable simulation approaches are being explored. The aspect of the performance with the greatest uncertainty is the extent of agent degradation during dissemination.

After looking at all available evidence in perspective, it is the opinion of the panel that field tests with binary GB would confirm that excessive degradation does not occur. Hence, the estimates of the efficiency of the round obtained with simulants should be valid. If field tests with binary are not possible, then it is the opinion of the panel that the round has been sufficiently well characterized that production of the round could proceed as the best possible alternative at this time.

That is the prelude. They go on to offer a disturbing point, which Professor Meselson mentioned yesterday, and let me read:

It should be realized that this alternative severely weakens the deterrent value of the munition and sets the precedent of stockpiling ordnances not fully field tested and produces unnecessary uncertainty in the Army planning.

They—the panel—were concerned that the lack of field testing could lead to lower confidence in the round in the minds of military people who very rightfully expect full field testing of weapons.

SECOND PANEL CONVENED

On the basis of that study, the Army convened a second panel and particularly focused on that issue: Can we have confidence in the reliability of the round? And that second panel came up with the conclusion that the Army's engineering on the round appears sound and straightforward and that it appears to be a worthwhile defense investment to replace the round in stockpile with the newer round.

As I said, the major uncertainty has to do with the dissemination characteristics. Certainly if we were allowed full field testing with agents, we would have higher confidence in obtaining optimal dissemination pattern. To a first order effect, I don't believe that significantly affects the deterrent value of these weapons.

Chairman HATFIELD. Could I interrupt a moment regarding the question you have raised on testing. Let me take another form of testing, one that deals with degradation.

AIR FORCE REPORT

Are you familiar with the Air Force report, "USAF, A Scientific Advisory Report, Ad Hoc Committee on Potential New Methods of Detection and Identification of Chemical Warfare Agents, September 1981," by the Scientific Advisory Board to the U.S. Air Force?

Dr. GOLD. Familiar might be too strong a word. I have seen the report.

Chairman HATFIELD. Well, let me just quote. These boards, I assume, since you have used one just now, are looked to to at least provide some kind of authoritative assessment or evaluation for the various branches of the armed services. Is that correct?

Dr. GOLD. These boards are used often to provide an objective and outside view; right.

Chairman HATFIELD. In this report, a key conclusion from the executive summary reads—and let me quote directly:

Experimental exposure of humans to live chemical agents is an extremely controversial and emotional issue. However, the DOD needs to find a way to get this information.

The study expands on this point in more than one particular area. Another place it says:

The political and emotional issues associated with live agents and human subjects are recognized as difficult but, nevertheless, their use is critical to acquiring key information regarding the effects of nerve agents on the ability to complete operational missions.

Obviously a question that would be raised in anyone's mind in reading this is if the Advisory Board feels this as strongly as it has worded the statements, using the word "critical" in a number of places, how does the Department of Defense intend to gather useful information that is entitled critical without the risk of using human beings? Is there a policy that has been decided on that question? If so, I would like to know what it is. And if there is a nonpolicy, can we get some kind of assurance about alternatives or assurance that the Department is not going to use human testing?

Dr. GOLD. The issue that the Air Force Science Board raised relates not to confidence in our munitions but to the ability to perform in defensive equipment on the contaminated battlefield.

Chairman HATFIELD. Yes, exactly.

Dr. GOLD. I agree with that fully. There is more uncertainty in terms of defensive protection than in terms of guaranteeing or insuring the reliability of the rounds. The current policy is that we are not going to

ask for resumption of full, open-air testing or exposure. As we go along with the program, there may be instances that come up, and I can conceive of them happening far more easily in a defensive area; for example, with regard to the performance of detectors. With regard to the performance of large-scale decontamination, that is an issue we have—

Chairman HATFIELD. That question is not on open-air testing. That is not my question.

Dr. GOLD. Excuse me; on humans?

Chairman HATFIELD. Yes.

Dr. GOLD. The policy, as far as I know, is that it will not be used.

Dr. WAGNER. That is right.

Dr. GOLD. We have no plans to change the policy. As far as I know it is not under study.

Chairman HATFIELD. In other words, you reject the findings of this particular board as to its assessment that such testing is critical?

Dr. WAGNER. We will simply have to live with the uncertainty, I believe.

Chairman HATFIELD. Pardon me?

MUST LIVE WITH UNCERTAINTY

Dr. WAGNER. We will simply have to live with the uncertainty.

Chairman HATFIELD. We will live with the uncertainty.

Dr. WAGNER. I believe one reason for wanting a retaliatory capability is because of those large uncertainties in the efficacy of our own protective equipment, so that we won't be forced to rely on the protective equipment alone.

Chairman HATFIELD. In other words, you feel confidence in pursuing this weapons program on the basis of these uncertainties?

Dr. WAGNER. I think we will simply have to live with them. There are uncertainties in any military analysis. That is only one, I believe, of the uncertainties in the assessment of the effectiveness of protective equipment.

Chairman HATFIELD. I wouldn't say with any weapons system. You can test a lot of weapons systems without the use of human beings.

Dr. WAGNER. We have no plans to.

Chairman HATFIELD. There may be other uncertainties in those weapons systems. But here you have a report. I may have misunderstood Dr. Gold. I think I heard Dr. Gold say that he thought it was critical to have that kind of—

Dr. GOLD. No; I said it was more important for certain aspects of a program than others. We do not feel it is critical. It is not critical at all in terms of our individual and collective protection, which we can gain and gather whatever information we need without any human testing.

Chairman HATFIELD. May I discard this report then as not applicable?

Dr. GOLD. Absolutely not. There is a difference of opinion, perhaps, on just what is critical and not critical in one aspect of the program. I certainly would not discard the whole report.

Chairman HATFIELD. Then what shall I do with this report? [Laughter.]

APPLICABILITY OF REPORT

Dr. GOLD. The key thing, I don't think it is applicable to the issue that we are discussing now, which is the reliability of the binary round and the need for retaliatory stockpile. It has applicability to certain aspects of our defensive posture.

Chairman HATFIELD. I think it is very applicable. I don't think we can discuss the funding of any program for the U.S. military departments that indicates through at least one official report that testing on human beings must be conducted. When it recognizes the emotional, the political factors associated, but nevertheless—and I underscore the word “nevertheless”—the use of such tests is deemed to be critical in acquiring key information regarding the effects of nerve agents on the ability to complete operational missions.

I do not understand how you can tell me that this is irrelevant to our issue at hand or to the subject upon which you are asking for an appropriation. It is very applicable. And I think the American people have a right to know exactly and precisely what your position is; to know what the administration's role is going to be in taking this recommendation and either chucking it in the ash can or revising your whole proposal for this particular weapon system.

Mr. GOLD. With regard to that particular facet of it, we disagree. We do not think it is critical.

Chairman HATFIELD. That is all I ask for; a total and complete rejection, that I can throw this part of it in the ash can.

Mr. GOLD. This part; yes.

Chairman HATFIELD. Thank you. Proceed.

Mr. GOLD. I have covered several of the issues raised particularly against the modernization part of our retaliatory program. Let me summarize by saying that is the one part of our program that there is disagreement on. With regard to the rest of the program—deterrence, protection, maintaining the stockpile—there is consensus and agreement.

Our only objective for having chemical weapons is to deter the use of chemical weapons against the United States and our allies. We have no other reason for them.

Let me conclude my statement at this time, and I would be happy to elaborate on some of the details in a closed session.

Chairman HATFIELD. Thank you, Dr. Gold.

[The statement follows:]

STATEMENT OF DR. THEODORE S. GOLD, DEPUTY ASSISTANT TO THE
SECRETARY OF DEFENSE (CHEMICAL MATTERS)

I AM PLEASED TO HAVE THIS OPPORTUNITY TO DISCUSS WITH YOU THE IMPORTANT TOPIC OF DETERRING CHEMICAL WARFARE. BEFORE I DESCRIBE OUR OVERALL PROGRAM I WILL ADDRESS TWO QUESTIONS THAT LIE AT THE HEART OF THE ISSUE BEFORE US TODAY. FIRST, CAN'T WE RELY ON (IMPROVED) PROTECTION ALONE TO DETER SOVIET USE OF CHEMICAL WEAPONS AGAINST US? THE ANSWER TO THIS QUESTION IS ABSOLUTELY NOT FOR REASONS WHICH I BELIEVE YOU MAY BE AWARE OF AND WHICH I WILL SOON REVIEW.

THIS NEGATIVE RESPONSE LEADS TO THE SECOND QUESTION--A VERY FAIR AND LEGITIMATE ONE--WHICH IS, CAN'T WE RELY ON OUR CURRENT STOCKS OF CHEMICAL WEAPONS TO PROVIDE THE NEEDED DETERRENCE? AGAIN THE ANSWER IS THE NEGATIVE. HOWEVER, THIS IS A MORE CONTROVERSIAL ISSUE AND WE ARE PREPARED TO GO INTO AS MUCH DETAIL AS THE COMMITTEE NEEDS TO MAKE AN INFORMED JUDGMENT.

THE REASON WE CANNOT RELY ON PROTECTION ALONE TO DETER SOVIET USE OF CHEMICAL WEAPONS IS THAT SUCH AN APPROACH WOULD LEAVE THEM WITH A DECISIVE MILITARY ADVANTAGE AND THUS AN INCENTIVE TO USE THESE WEAPONS. IMPROVED PROTECTION CAN SAVE AND REDUCE CASUALTIES; AND WE VIEW A STRONG PROTECTIVE CAPABILITY AS A CRITICAL COMPONENT OF OUR PROGRAM TO DETER CHEMICAL WEAPONS USE. INDEED, THIS IS THE AREA REQUIRING BY FAR THE MOST EMPHASIS IN RESOURCE EXPENDITURE. HOWEVER, AS IMPORTANT AS PROTECTIVE MEASURES ARE, ALONE THEY ARE INSUFFICIENT TO DETER CHEMICAL USE AGAINST US. WITH CURRENT CHEMICAL PROTECTIVE GEAR, WE FACE A SIGNIFICANT REDUCTION IN OPERATIONAL EFFECTIVENESS--IN MANY CASES MORE THAN 50 PERCENT--DUE TO THE RESTRICTIONS IMPOSED BY PROTECTIVE EQUIPMENT AND PROCEDURES. WE ARE EXPENDING CONSIDERABLE TIME, EFFORT, AND MONEY TO DEVELOP BETTER PROTECTIVE EQUIPMENT; HOWEVER, IMPROVED EQUIPMENT WILL NOT ELIMINATE THE PERFORMANCE DECREMENT. IF WE ARE FORCED TO OPERATE ENCUMBERED BY PROTECTIVE EQUIPMENT AND PROCEDURES IN A CONTAMINATED ENVIRONMENT WHILE THE ENEMY IS ALLOWED TO OPERATE UNENCUMBERED IN A CLEAN ENVIRONMENT, CHEMICAL WEAPONS CAN OFFER HIM THE SAME RESULTS AS AN EXTREMELY HIGH CASUALTY RATE, EVEN IF HE KILLS NO ONE. THEREFORE, IN ADDITION TO IMPROVING OUR PROTECTION AGAINST CHEMICAL WEAPONS, WE NEED THE CAPABILITY TO FORCE THE INITIATOR OF CHEMICAL WARFARE TO ALSO OPERATE IN A CONTAMINATED ENVIRONMENT, TO USE HIS PROTECTIVE SYSTEMS AND THUS ALSO SUFFER A PERFORMANCE DECREMENT; ONLY THEN WILL HE SEE LITTLE ADVANTAGE IN USING CHEMICAL WEAPONS AND BE DETERRED.

THE CAUSES OF PERFORMANCE DEGRADATION ARE TWOFOLD: INDIVIDUAL PROTECTION AND UNIT DEFENSIVE PROCEDURES. FIRST, THERE ARE THE ENCUMBERANCES OF THE PROTECTIVE EQUIPMENT ITSELF. WEARING EQUIPMENT DESIGNED TO PROTECT AGAINST A VERY HOSTILE ENVIRONMENT UNAVOIDABLY INCREASES THE HEAT LOAD ON THE INDIVIDUAL AND MAKES CERTAIN PHYSICAL ACTIVITY DIFFICULT TO IMPOSSIBLE DEPENDING ON THE TEMPERATURE. THERE IS THE LOSS OF VISUAL ACUITY CAUSED BY WEARING A MASK, LOSS OF MANUAL DEXTERITY CAUSED BY WEARING PROTECTIVE GLOVES (WHICH MUST BE RUGGED AND STURDY) AND THE LOSS OF MANEUVERABILITY CAUSED BY WEARING PROTECTIVE BOOTS. THERE ARE ALSO CONSIDERABLE PROBLEMS IN COMMUNICATION AMONG INDIVIDUALS WEARING MASK AND PROTECTIVE HOODS. ADDED TO THE ENCUMBERANCES OF THE PROTECTIVE EQUIPMENT ARE THE PROBLEMS CAUSED BY THE ADDITIONAL TASKS THAT MUST BE ACCOMPLISHED TO SURVIVE ON THE CONTAMINATED BATTLEFIELD. THESE INCLUDE CONTAMINATION AVOIDANCE PROCEDURES, DECONTAMINATION, BOTH PERSONNEL AND EQUIPMENT, AND INCREASED LOGISTICAL BURDENS. CHEMICAL ATTACKS, WHICH FORCE OUR TROOPS TO FIGHT, TO OPERATE SOPHISTICATED EQUIPMENT, TO TREAT AND EVACUATE CASUALTIES, TO REPAIR RUNWAYS, TO HANDLE AND UNLOAD SUPPLIES, TO COMMUNICATE, TO FLY HIGH PERFORMANCE AIRCRAFT AND HELICOPTERS, TO REPAIR EQUIPMENT, TO LOAD AMMUNITION AND DO THE MULTITUDE OF CRITICAL TASKS NEEDED TO SUPPORT MILITARY OPERATION, IN PROTECTIVE GEAR, WHILE THE SOVIET FORCES WOULD BE LARGELY FREE TO OPERATE UNENCUMBERED IN A NONCONTAMINATED ENVIRONMENT WOULD BE EXTREMELY EFFECTIVE. WE CANNOT ALLOW THE SOVIETS SUCH A DECISIVE ADVANTAGE. WE NEED THE CAPABILITY TO FORCE HIM TO ALSO OPERATE IN A CONTAMINATED ENVIRONMENT AND FACE THE SAME ENCUMBERANCES.

TO BE AN EFFECTIVE DETERRENT, A CHEMICAL STOCKPILE MUST BE ABLE TO THREATEN CRITICAL ELEMENTS OF AN ENEMY'S FORCE STRUCTURE. THESE INCLUDE FRONT LINE, SECOND AND THIRD ECHELON TROOPS; CRITICAL COMMAND, CONTROL, AND COMMUNICATIONS CENTERS; AIRFIELDS, LOGISTICS FACILITIES; AND TRANSPORTATION NODES. IT MUST ALSO PROVIDE COMMANDERS THE FLEXIBILITY, IN TERMS OF AGENT AND WEAPON SYSTEMS, TO MATCH RETALIATORY CHEMICAL STRIKES TO THE TARGET CHARACTERISTICS AND MILITARY OBJECTIVE. FINALLY, THERE MUST BE SUFFICIENT MUNITIONS TO SUSTAIN RETALIATORY OPERATIONS LONG ENOUGH THAT AN ENEMY WILL SEE NO ADVANTAGE IN PROLONGING A CHEMICAL EXCHANGE.

THE CURRENT US RETALIATORY CHEMICAL STOCKPILE IS INADEQUATE FOR THIS DETERRENT ROLE. IT IS NOT A QUESTION OF THE TOTAL AMOUNT OF CHEMICAL AGENTS, BUT

RATHER PRIMARILY A LACK OF MILITARILY USEFUL WEAPONS. ABOUT 61 PERCENT OF THE CHEMICAL AGENT IS STORED IN BULK CONTAINERS. THERE IS NO CAPABILITY TO USE THIS BULK AGENT EXCEPT IN A FEW OLD AIRCRAFT-CARRIED SPRAY TANKS (EXTREMELY VULNERABLE AGAINST MODERN AIR DEFENSES) IN IMPROVISED LAND MINES (OF VERY DOUBTFUL MILITARY UTILITY) OR AS FILL FOR NEW MUNITIONS (IF A LOADING CAPABILITY IS REESTABLISHED). ABOUT 3 PERCENT IS IN UNREPAIRABLE MUNITIONS INCLUDING LEAKERS. ANOTHER 8 PERCENT IS IN OLD ROCKETS WHICH HAVE DETERIORATED AND FOR WHICH LAUNCHERS NO LONGER EXIST. THE REMAINING APPROXIMATELY 28 PERCENT IS COMPRISED OF WHAT WE CALL READY OR REPAIRABLE MUNITIONS. HOWEVER, MOST OF THESE MUNITIONS HAVE OR WILL HAVE, LITTLE OR NO MILITARY UTILITY; BECAUSE THEIR DELIVERY SYSTEMS ARE COMING OUT OF THE INVENTORY (105MM HOWITZERS, 4.2 INCH MORTARS) OR BECAUSE THEY ARE INEFFECTIVE (AERIAL SPRAY TANKS, LAND MINES, AND PROJECTILES FILLED WITH MUSTARD AGENT WHICH FREEZES AT 58°F). FINALLY WE COME TO THE REMAINING LESS THAN 10 PERCENT OF OUR CHEMICAL AGENT STOCK WHICH IS IN MUNITIONS WITH SOME MILITARY UTILITY. THESE ARE 155MM AND 8 INCH ARTILLERY PROJECTILES AND BOMBS WITH NON-PERSISTENT AGENTS. HOWEVER, THE AMOUNT OF THESE USEABLE MUNITIONS IS NOT SUFFICIENT; MOREOVER, THERE ARE CRITICAL CAPABILITY DEFICIENCIES.

PROBABLY OF MOST SIGNIFICANCE, THE STOCKPILE IS LACKING IN WEAPONS SUITABLE FOR USE AGAINST REAR ECHELON TACTICAL TARGETS. THE ONLY WAY TO FORCE LONG-TERM DEGRADATION ON REAR TARGETS IS TO CONTAMINATE THEM WITH A PERSISTENT AGENT. HOWEVER, ALL OUR BOMBS ARE FILLED WITH NONPERSISTENT NERVE AGENT. THE ONLY REAR ECHELON PERSISTENT AGENT CAPABILITY IS IN A SMALL NUMBER OF AIRCRAFT SPRAY TANKS WHOSE DELIVERY CHARACTERISTICS MAKE THE AIRCRAFT EXTREMELY VULNERABLE AGAINST MODERN AIR DEFENSES. THUS THE AIRFIELDS, SUPPLY AND MAINTENANCE CENTERS AND OTHER CRITICAL FACILITIES NEEDED TO SUPPORT WARSAW PACT MILITARY OPERATION, WOULD NOT BE FORCED TO CONTEND WITH THE SEVERE PROBLEMS OF A CHEMICALLY CONTAMINATED ENVIRONMENT. THE NAVY HAS A VERY LIMITED RETALIATORY CAPABILITY CONSISTING OF WETEYE AND MK-94 BOMBS CONTAINING A NON-PERSISTENT AGENT.

BY THEIR NATURE, THE CURRENT UNITARY MUNITIONS IMPOSE LOGISTICAL AND OPERATIONAL RESTRICTIONS WHICH REDUCE THEIR UTILITY AND INCREASE COSTS. THEY REQUIRE ELABORATE SAFETY PRECAUTIONS DURING STORAGE, HANDLING, AND SHIPMENT. FOR EXAMPLE, THE AIR FORCE SPRAY TANK WEIGHS ABOUT 2,000 LBS, BUT COMES IN A 4,000 LB SHIPPING CONTAINER. THUS, TWO-THIRDS OF THE TRANSPORTATION REQUIREMENT YIELDS NO COMBAT CAPABILITY.

UNITARY MUNITIONS ALSO PRESENT A HAZARD TO OUR OWN POSITIONS IF DAMAGED BY AN ENEMY ATTACK. THIS PROBLEM IS PARTICULARLY SEVERE FOR NAVAL VESSELS.

FINALLY, WE HAVE EVIDENCE OF PHYSICAL DETERIORATION OF CURRENT MUNITIONS AND AGENTS. RECENT SAMPLING REVEALS THAT THE NERVE AGENT IN READY AND REPAIRABLE MUNITIONS HAS BEGUN DECOMPOSITION DURING THEIR LONG (12 TO OVER 35 YEARS) STORAGE PERIOD. ONE COMPLICATION IS REDUCED EFFECTIVENESS ALTHOUGH THE 155MM AND 8 INCH ROUNDS STILL MEET MINIMUM STANDARDS. MORE SERIOUS IS THAT THE MUNITIONS ARE BECOMING UNPREDICTABLE IN THEIR FLIGHT CHARACTERISTICS DUE TO METAL PARTS EXPOSURE TO CORROSIVE DECOMPOSITION PRODUCTS (PARTICULARLY HYDROGEN FLUORIDE). LEAKS OCCUR. ALTHOUGH THE TOTAL NUMBER OF LEAKERS IS SMALL (MUCH LESS THAN 1 PERCENT), THEY ARE BEING FOUND WITH INCREASING FREQUENCY IN THE OLDER WEAPONS INDICATING DETERIORATION OF THE METAL OVER TIME. THEREFORE, WE WILL MONITOR THE STRUCTURAL INTEGRITY OF THE MUNITIONS, PARTICULARLY ARTILLERY PROJECTILES WHICH ARE SUBJECTED TO HIGH FIRING STRESSES, TO DETERMINE IF THEY WILL BE SAFE TO USE.

THUS, WE SEE THAT THE CURRENT RETALIATORY STOCKPILE IS DEFICIENT IN MILITARY CAPABILITY, BOTH QUALITATIVELY AND QUANTITATIVELY, IS LESS SAFE TO HANDLE, AND MORE EXPENSIVE IN LOGISTICAL RESOURCES THAN IT COULD BE, AND INDEED MAY BE TOTALLY UNUSEABLE WITHIN THE NEXT 10 TO 20 YEARS.

THE CHOICES BEFORE US ARE NOT DETERRENCE OR DEFENSES OR RETALIATION. GROUPING THESE AS ALTERNATIVES CONFUSES OBJECTIVES AND MEANS. OUR OBJECTIVE UNTIL WE CAN ACHIEVE A VERIFIABLE BAN, IS DETERRENCE--THE MEANS OF ACHIEVING THIS OBJECTIVE ARE THE ABILITY TO SURVIVE AND FIGHT AS WELL AS THE SOVIETS CAN IN A CONTAMINATED ENVIRONMENT AND THE ABILITY TO FORCE HIM TO FIGHT IN SUCH AN ENVIRONMENT IF HE USES CHEMICAL WEAPONS. BOTH ARE NECESSARY TO DENY THE SIGNIFICANT ADVANTAGE THE SOVIETS WOULD NOT GAIN FROM INITIATING CHEMICAL WARFARE.

I WILL NEXT TURN TO OUR PROGRAM TO DETER CHEMICAL WARFARE. BASED ON THE PREVIOUS DISCUSSION THE PROGRAM NATURALLY DIVIDES INTO TWO COMPONENTS; IMPROVING OUR PROTECTION AGAINST CHEMICAL ATTACKS, AND ASSURING A CREDIBLE RETALIATORY CAPABILITY. THERE IS ADDITIONALLY A THIRD COMPONENT--DISPOSING OF OUR OBSOLETE MUNITIONS (DEMILITARIZATION) WHICH IS A FORMIDABLE PROBLEM IN ITS OWN RIGHT.

THE OBJECTIVE OF THE PROTECTIVE COMPONENT OF OUR PROGRAM IS TO ENSURE OUR MILITARY FORCES CAN SURVIVE AND TO GIVE THEM THE BEST POSSIBLE ABILITY TO SUSTAIN EFFECTIVE OPERATIONS IN A CONTAMINATED ENVIRONMENT. THERE ARE THREE BASIC ELEMENTS TO THE PROTECTIVE COMPONENT OF OUR PROGRAM: TO REESTABLISH A STRONG TECHNOLOGY BASE, TO DEVELOP APPROPRIATE DOCTRINE AND CONDUCT TRAINING RELEVANT TO

OPERATING IN THE CHEMICAL ENVIRONMENT, AND TO PROCURE AND DEPLOY PROTECTIVE EQUIPMENT IN SUFFICIENT QUANTITY AND QUALITY TO PROVIDE FOR SUSTAINED OPERATIONS.

A STRONG TECHNOLOGY BASE AND RESEARCH AND DEVELOPMENT PROGRAM ARE REQUIRED AS INSURANCE AGAINST TECHNOLOGICAL SURPRISE AND TO PRODUCE NEW PROTECTIVE SYSTEMS WHICH REDUCE THE RESTRICTIONS ASSOCIATED WITH PRESENT EQUIPMENT AND FILL THE MANY GAPS IN OUR CURRENT PROTECTIVE CAPABILITY. IT IS NECESSARY TO UPDATE, AND IN SOME CASES, CREATE MILITARY DOCTRINE TO INTEGRATE CHEMICAL DEFENSE INTO OUR COMBAT CAPABILITIES. WE MUST ALSO TRAIN OUR FORCES TO PERFORM THE WARTIME TASKS WHILE USING PROTECTIVE SYSTEMS. THIS TRAINING SHOULD BE UNDER THE MOST REALISTIC CONDITIONS POSSIBLE--PREFERABLY FIELD EXERCISES USING TRAINING SIMULANTS. FINALLY, WE NEED TO FIELD SUFFICIENT QUANTITIES OF THE BEST POSSIBLE PROTECTIVE SYSTEMS IN ALL AREAS: INDIVIDUAL PROTECTION, COLLECTIVE PROTECTION, DETECTION AND WARNING, DECONTAMINATION, AND MEDICAL.

MAJOR PROGRESS IN THE PAST FEW YEARS, IN ADDITION TO RECOGNITION OF THE CHEMICAL THREAT, HAS BEEN IN THE DISTRIBUTION OF INDIVIDUAL PROTECTIVE EQUIPMENT, PARTICULARLY TO OUR SOLDIERS AND AIRMEN, AND IN EXPANDING TRAINING, BOTH INDIVIDUAL (BASIC AND ADVANCED) AND UNIT.

THERE REMAINS SERIOUS QUALITATIVE AND QUANTITATIVE DEFICIENCIES IN OUR PRESENT CHEMICAL PROTECTIVE CAPABILITY.

KEY DEFICIENCIES FOR ALL SERVICES ARE THE LACK OF PROTECTIVE CLOTHING WHICH IS NOT DEBILITATING IN ITS OWN RIGHT; COLLECTIVE PROTECTION SYSTEMS FOR KEY EQUIPMENT, FACILITIES, AND REST AND RELIEF AREAS; ADEQUATE DETECTION AND WARNING DEVICES CAPABLE OF RESPONDING TO ALL THREAT AGENTS; DECONTAMINATION EQUIPMENT AND AGENTS WHICH ARE EFFECTIVE AND USEABLE ON ALL EQUIPMENT; AND THE CAPABILITY TO TREAT LARGE NUMBERS OF CHEMICAL AND CONVENTIONAL CASUALTIES IN A TOXIC ENVIRONMENT. FINALLY, MUCH REMAINS TO BE DONE TO IMPLEMENT RELEVANT TRAINING AND DEVELOP APPROPRIATE DOCTRINE.

THE PROTECTIVE COMPONENT OF OUR PROGRAM AIMS AT CORRECTING THESE DEFICIENCIES. THE TOTAL FY 1983 REQUEST FOR PROTECTIVE PURPOSES IS \$508M. OF THAT AMOUNT, RDT&E TO SOLVE OUR LONGER-TERM QUALITATIVE PROBLEMS REPRESENTS \$236M. ACQUISITION OF DEFENSIVE SYSTEMS, THROUGH OUR PROCUREMENT AND O&M ACCOUNTS, COMES TO \$263M, AND \$9M IS FOR CONSTRUCTION OF TRAINING FACILITIES. INVESTMENT IN PROTECTIVE IMPROVEMENTS REPRESENTS MORE THAN 70% OF OUR TOTAL FY 1983 CHEMICAL BUDGET REQUEST AND IS EXPECTED TO ABSORB APPROXIMATELY TWO-THIRDS OF OUR PROGRAM COSTS THROUGH FY 1987. WE WILL CONTINUE TO SUPPORT A VIGOROUS RDT&E PROGRAM TO SEARCH FOR BETTER PROTECTIVE SYSTEMS. THE AMOUNT DEVOTED TO ACQUISITION WILL INCREASE AS THE RDT&E PROGRAM BEARS FRUIT. WE WILL CONTINUE TO PLACE MAJOR EMPHASIS ON DEVELOPING DOCTRINE, AND IMPLEMENTING TRAINING, AND EXERCISES.

THE OBJECTIVE OF THE RETALIATORY COMPONENT OF OUR PROGRAM IS TO MAINTAIN THE SAFEST SMALLEST STOCKPILE THAT DENIES A SIGNIFICANT MILITARY ADVANTAGE TO ANY INITIATOR OF CHEMICAL WARFARE. WE NEED NOT MATCH THE SOVIETS IN AGENT/MUNITION QUANTITIES AND TYPES. RATHER, OUR STOCKPILE REQUIREMENTS ARE DRIVEN BY THE NEED TO FORCE THE INITIATOR OF CHEMICAL WARFARE TO OPERATE ENCUMBERED BY PROTECTIVE CLOTHING AND BURDENED BY THE LOGISTICS AND REDIRECTION OF COMBAT POWER NECESSARY TO SUSTAIN OPERATIONS IN A CW ENVIRONMENT. FACTORS CONSIDERED IN DERIVING STOCKPILE REQUIREMENTS INCLUDE THE POTENTIAL TARGETS FOR CHEMICAL RETALIATION, WEAPON AND AGENT EFFECTS, EXPLOITABLE SOVIET VULNERABILITIES, US DOCTRINE AND FORCE STRUCTURE, AND ESTIMATES OF THE DURATION OF POTENTIAL CONFLICTS. BECAUSE GROWTH IN THE SOVIET CHEMICAL STOCKPILE WOULD HAVE LITTLE BEARING ON THE NUMBER OF SUITABLE CHEMICAL TARGETS IN THEIR FORCE STRUCTURE, OUR MUNITIONS REQUIREMENTS ARE LARGELY INSENSITIVE TO CHANGES IN THEIR STOCKPILE.

OUR PROGRAM TO MODERNIZE THE US RETALIATORY STOCKPILE IS TWO PRONGED: ENHANCING THE READINESS OF THE CURRENT STOCKPILE AND PRODUCING BINARY CHEMICAL WEAPONS.

THE UTILITY OF THE CURRENT STOCKPILE IS BEING ENHANCED BY UPGRADING MUNITIONS TO INCREASE READINESS, AND INCREASING MAINTENANCE AND AIRCRAFT COMPATIBILITY. THE AERIAL SPRAY TANKS ARE BEING MADE COMPATIBLE WITH AIRCRAFT TO PROVIDE AT LEAST SOME CAPABILITY UNTIL THE BINARY BOMB IS AVAILABLE. HOWEVER, THESE WILL NOT ALTER THE DECLINE IN USEABLE MUNITIONS DUE TO THE PHASING OUT OF DELIVERY SYSTEMS NOR ALLOW THE USE OF BULK MUNITIONS NOR PROVIDE AN EFFECTIVE CAPABILITY AGAINST DEEP TARGETS. THIS MAINTENANCE EFFORT WILL COST APPROXIMATELY \$19M IN FY 83, INCLUDING \$1M FOR CONSTRUCTION OF A MAINTENANCE FACILITY ON JOHNSTON ISLAND. THIS MAINTENANCE EFFORT IS REQUIRED TO MAINTAIN A RETALIATORY CAPABILITY UNTIL BINARY MUNITIONS BECOME AVAILABLE.

OUR PLANS ARE TO PRODUCE TWO BINARY WEAPONS, THE 155MM ARTILLERY PROJECTILE AND THE BIGEYE BOMB, DURING THE FY 1983-1987 PERIOD TO PROVIDE THE CAPABILITY TO ATTACK BOTH FRONT LINE AND REAR ECHELON TARGETS. BINARY MUNITIONS AS BEING DEVELOPED BY THE U.S. CONTAIN TWO SEPARATE RELATIVELY NONTOXIC SUBSTANCES WHICH ARE MIXED WHEN THE MUNITION IS IN FLIGHT TO THE TARGET TO YIELD THE STANDARD

NERVE AGENTS. THE PLAN WILL PROVIDE FORCE SUSTAINABILITY AND IMPROVE OPERATIONAL EFFECTIVENESS IN A CONTAMINATED ENVIRONMENT, WHILE CORRECTING CHEMICAL WEAPONS STOCKPILE DEFICIENCIES. BINARY MUNITIONS ARE PREFERABLE TO FILLING MORE UNITARY MUNITIONS, BECAUSE THEY CAN BE MORE EASILY MOVED FORWARD IN TIMES OF CRISIS; DO NOT PRESENT A HAZARD IF DAMAGED IN AN ATTACK ON OUR MUNITIONS AREAS; AND PROVIDE SIGNIFICANT SAFETY AND LOGISTICAL ADVANTAGES THROUGHOUT THE MANUFACTURE, STORAGE, USE, AND EVENTUAL DISPOSAL SEQUENCE. WHEN FIRED, THE 155MM ARTILLERY ROUND YIELDS THE NONPERSISTENT NERVE AGENT GB. THE BIGEYE WILL YIELD THE PERSISTENT NERVE AGENT VX. IN MANUFACTURE, STORAGE, AND SHIPMENT, THE TWO BINARY COMPONENTS WILL BE SEPARATED. THE COMPONENTS WILL NOT BE MATED UNTIL AUTHORITY IS RECEIVED TO CONDUCT RETALIATORY CHEMICAL ATTACKS, AND THE ACTUAL AGENT IS NOT PRODUCED UNTIL THE MUNITION IS IN FLIGHT TO THE TARGET. THE TOTAL BINARY FUNDING REQUEST FOR FY 1983 IS \$104M, \$30M OF WHICH IS FOR MUNITIONS PROCUREMENT. THE REMAINDER IS FOR RDT&E (\$32M) AND CONSTRUCTING AND EQUIPING BIGEYE PRODUCTION FACILITIES (\$42M). PROCUREMENT OF THESE MUNITIONS IS EXPECTED TO COST LESS THAN \$1B DURING THE FY 1983-1987 PERIOD.

BEYOND 1987, REQUIREMENTS FOR PRODUCTION OF THE 155, BIGEYE, OR ANY OTHER CHEMICAL WEAPON WILL DEPEND ON THE OUTCOME OF DISARMAMENT EFFORTS AND CONTINUING REFINEMENT OF MILITARY NEEDS. A MAJOR ROLE OF OUR OFFICE WILL BE TO CLOSELY EVALUATE THESE NEEDS.

I WILL ONLY BRIEFLY ADDRESS THE PROBLEM OF DEMILITARIZATION; I.E., DISPOSING OF OLD MUNITIONS. USING CURRENT TECHNOLOGY, DISPOSING OF THE ENTIRE STOCKPILE, WHICH WE EVENTUALLY MUST DO, COULD COST AS MUCH AS \$4B. APPROXIMATELY 10% OF OUR FY 1982 BUDGET REQUEST (\$74M) IS FOR EITHER DEMILITARIZATION OF CURRENT UNSERVICEABLE MUNITIONS (\$61M) OR R&D DIRECTED AT FINDING MORE COST EFFECTIVE TECHNOLOGY APPROPRIATE FOR THE MUCH GREATER TASK OF DISPOSING OF THE ENTIRE STOCKPILE.

WE ANTICIPATE EXPENDITURES FOR CHEMICAL WARFARE DETERRENT PROGRAMS WILL BE APPROXIMATELY \$6-7B DURING THE FY 1983-1987 PERIOD. CHEMICAL PROTECTION WILL ACCOUNT FOR APPROXIMATELY TWO-THIRDS OF THE PROJECTED COSTS, WITH THE REMAINDER EQUALLY ALLOCATED TO PROVIDE A RETALIATORY CAPABILITY AND CONTINUE RDT&E AND PILOT PLANT DEMILITARIZATION FOR OBSOLETE EXISTING CHEMICAL STOCKS.

WE HAVE DESCRIBED WHAT WE BELIEVE IS A PRUDENT AND RESTRAINED PROGRAM TO REDRESS A VERY SERIOUS DEFICIENCY. OUR OBJECTIVE IS TO ELIMINATE THE THREAT OF CHEMICAL WARFARE THROUGH A COMPLETE AND VERIFIABLE BAN ON CHEMICAL WEAPONS. UNTIL WE CAN ACHIEVE SUCH A BAN, ONE MUST DETER THE SOVIET UNION FROM USING THEIR FORMIDABLE CAPABILITIES TO WAGE CHEMICAL WARFARE AGAINST US OR OUR ALLIES. IN ORDER TO DETER, WE MUST IMPROVE BOTH OUR PROTECTIVE AND RETALIATORY CAPABILITIES. OUR PROGRAM WILL IMPLEMENT TRAINING AND DEVELOP DOCTRINE, PROCURE AND DISTRIBUTE PROTECTIVE EQUIPMENT, CONDUCT A VIGOROUS R&D PROGRAM TO DEVELOP IMPROVED PROTECTIVE SYSTEMS, MAINTAIN THE MILITARILY USEFUL PORTION OF THE CURRENT RETALIATORY STOCKPILE, DISPOSE OF THE REMAINDER AND FINALLY DEVELOP AND PROCURE BINARY MUNITIONS. OUR ONLY OBJECTIVE FOR HAVING CHEMICAL WEAPONS IS TO DETER THE USE OF CHEMICAL WEAPONS AGAINST THE UNITED STATES OR OUR ALLIES. THERE IS NO OTHER REASON.

THIS PROGRAM WILL REDUCE THE THREAT OF CHEMICAL WARFARE AND HOPEFULLY FINALLY HELP TO ELIMINATE IT BY CONVINCING THE SOVIETS THAT THEY WOULD HAVE LITTLE TO GAIN FROM CHEMICAL WARFARE AND THEREBY GIVE THEM INCENTIVE TO JOIN WITH US IN OUR OBJECTIVE OF SEEKING A COMPLETE AND VERIFIABLE BAN ON THE DEVELOPMENT, PRODUCTION, AND STOCKPILING OF SUCH WEAPONS. IF WE ARE SUCCESSFUL IN ACHIEVING THIS BAN, WE WILL BE ABLE, AND IN FACT EAGER, TO TERMINATE THE CHEMICAL WEAPONS PROGRAM.

Chairman HATFIELD. I believe, Mr. Thomas, you have a statement to make.

Mr. THOMAS. Sir, I was just here with Rick Burt, and he made the Department of State's statement.

Chairman HATFIELD. All right. Thank you.

Senator Pryor, do you have further questions you would like to ask?

Senator PRYOR. I think not in the open session. Thank you, Mr. Chairman.

Chairman HATFIELD. Let me ask one or maybe two more questions in open session. Then I have a passel of questions for the closed session.

OFFENSIVE VIEW OF CHEMICAL WARFARE

Dr. Gold, I wonder if you would clarify for me, please, the main objective of the chemical warfare weapons system from the offensive, rather than defensive, point of view. Is it to drive the enemy into protective clothing or posture, or to inflict casualties on what might be considered a well-protected foe?

Dr. GOLD. We would like to be able to do both, but since you can get protection against chemicals, at least from a survival standpoint, with equipment and training, the major emphasis will be to force them into a degraded posture, not only from wearing and operating in the equipment but also from the procedures and activities you would have to do to decontaminate, to avoid contaminated areas. So it is the performance degradation.

Chairman HATFIELD. If you were to make a quantitative assessment of the required arsenal to reach one objective or the other, let's say between the objective of driving the enemy into a protective posture or inflicting casualties, which would require the greater amount of weapons program or material?

Dr. GOLD. You would require far more weapons to cause casualties, certainly against an enemy that was already in protective clothing.

FIVE-YEAR COSTS

Chairman HATFIELD. Can you give me in open session your total life cost estimate of this program that you anticipate will be required to reach the quantitative levels?

Dr. GOLD. Let me start off by reviewing what the 5-year costs will be and then we can add on to that.

We estimate that the 5-year cost for the total chemical warfare program will be on the order of \$6 to \$7 billion.

Chairman HATFIELD. \$6 to \$7 billion?

Dr. GOLD. Yes; \$6 to \$7 billion. About two-thirds of that, or over \$4 billion, will be devoted to the protective aspects of that. About one-sixth of that, on the order of \$1 billion, will be for the demilitarization. The remaining one-sixth, or again on the order of \$1 billion, will be for the retaliatory portion. Most of that will be for the new munitions. A small part of that will be to maintain the current stockpile.

OPERATION AND MAINTENANCE COST

Chairman HATFIELD. What would be the cost for the operation and maintenance of the weapons program during the reasonable life of the program?

Dr. GOLD. The operations and maintenance—you are talking about the munitions, the stockpile part of it—would be on the order of a few tens of millions per year at the most.

Chairman HATFIELD. How much?

Dr. GOLD. A few tens of millions to maintain the stockpile, less when we have a binary stockpile, because the binary stockpile is easier and less costly to maintain than the unitary stockpile.

Chairman HATFIELD. The Institute for Defense Analysis has developed and published an unclassified methodology for estimating civilian casualties from chemical warfare in Europe. Could you supply for the record, if you do not have it at the moment, estimates of total civilian casualties from use of, say, 10,000, 15,000, 20,000 agent-tons of chemical in a European chemical war?

Dr. GOLD. We will be able to supply it for the record. I don't have those figures with me.

[The information follows:]

IMPACT OF CHEMICAL WARFARE ON CIVILIAN POPULATIONS

In their December 1981 study, "Chemical Warfare in Central Europe, Circa 1986 (S)," the Institute for Defense Analysis evaluated the impact of chemical warfare on civilian populations. The analysis looked at both Warsaw Pact use and NATO retaliation at various constraint levels. By constraints, we mean avoiding chemical attacks when population centers could be affected. The study assumed that both NATO and the Warsaw Pact observed the same level of constraint. This probably leads to an underestimation of the total number of civilian casualties because: (1) There is no evidence that the Soviets would be constrained from chemical use by the prospect of widespread civilian casualties among their enemies. In fact, civilians have often been specific targets of Soviets, or Soviet-sponsored, chemical use. (2) The Soviets have a variety of deep strike chemical weapon systems for attacking critical NATO rear area targets, many of which are in close proximity to civilian population centers.

SPECIAL TOPICS (U)

A. IMPACT OF CHEMICAL WARFARE ON CIVILIAN POPULATION (U)

(U) Any use of chemical weapons by the U.S. or non-U.S. NATO forces in Central Europe will in some way or another be constrained or conditioned by the existence of a large civilian population. It is one thing to be aware of the particular constraints to be followed, but another thing to be able to fight effectively within those constraints.

(U) Two problems that the military face in this situation are: (1) it is impossible to predict what the civilians will do once fighting begins, (2) it is difficult to know local wind conditions accurately enough to be able to predict the exact area coverage of specific chemical fire missions.

(U) As a result of these uncertainties this study has taken a parametric analysis approach to the problem of determining civilian casualties from the use of chemical weapons. Since one cannot know with much certainty, after the fighting starts, how the population will be distributed throughout the NATO Corps areas, three different civilian population levels were considered as constraints to the targeting of chemical weapons. These targeting constraints were towns and cities whose populations were greater than 2,000, 10,000, and 20,000 people. This meant that a particular chemical fire mission would be cancelled if civilians in these locations could be exposed to lethal levels of chemical agent.

(U) The distribution, that has been assumed for this analysis, of the civilian population into various physical locations, which serve as protection against chemical effects, is presented below. (Values in parentheses are for rear areas, other values refer to forward areas):

- (U) 10(15) percent in the open,
- (U) 60(50) percent in single-story buildings,
- (U) 15(30) percent in multi-story buildings,
- (U) 15(5) percent in basements.

Since the distribution of civilian population over time can change quite significantly among the locations shown above, as well as among the towns and cities that are being considered as targeting constraints, a period of only five combat days is considered.

(U) The estimation of civilian casualties resulting from the use of chemical weapons is made as follows: It is assumed

for the analysis that all people who normally live in towns or cities that have populations less than the targeting constraint level will be considered as part of a rural density for that area of the battlefield. As the allowable chemical weapons are fired, civilians composing the rural density are the ones vulnerable to becoming a casualty.¹

(U) The results presented below in Table A-1 depict the impact that various targeting constraints have on the level of casualties inflicted. Data are presented for cases where a day is considered to be 24 hours of combat or 14 hours of combat.

(U) The associated level of military casualties for the same set of chemical fire missions and the same targeting constraints are shown in Table A-2.

¹(U) This approach to casualty assessment tends to underestimate civilian casualties. But without specific consideration of evacuation plans or refugee movements, any peacetime population distribution will more than likely be far off the actual distribution for any situation.

Table A-1. (U) CIVILIAN CASUALTIES BY TARGETING CONSTRAINT LEVEL

UNCLASSIFIED				
Civilian Population Constraint	Civilian Casualties ^a Inflicted By		Total Civilian Casualties ^a for Five Days of Combat	
	NATO	Pact	24 Hours/Day	14 Hours/Day
2,000	2,050	10,830	12,880	7,510
10,000	4,610	31,720	36,320	21,210
20,000	8,280	56,650	64,930	37,880

^a(U) These are NATO civilians only; Pact and NATO forces are assumed to follow the same targeting constraint.

Table A-2. (U) MILITARY CASUALTIES VERSUS TARGETING CONSTRAINT LEVEL

UNCLASSIFIED				
Civilian Population Constraint	Military Casualties Inflicted By		Total Military Casualties for Five Days	
	NATO	Pact	24 Hours/Day	14 Hours/Day
2,000	3,721	15,224	18,945	11,050
10,000	7,588	24,422	32,010	18,675
20,000	7,735	25,315	33,050	19,275

It should be readily apparent that as the targeting constraints are made less restrictive, the number of civilian casualties increases. The military casualties, however, do not increase in the same manner. Part of the reason for this is that there are thousands of cities and towns in West Germany that are between the 2 and 10 thousand population levels.

[Deleted.]

A 1972 report from Lawrence Livermore Laboratory [1] indicated that approximately 44 percent of the FRG population lived in cities of less than 10,000 population.

(U) A summary of the differences between the number of civilian and military casualties inflicted for a given level of chemical weapons used is presented in Table A-3.

Table A-3. (U) CIVILIAN VERSUS MILITARY CASUALTIES
BY CONSTRAINT LEVEL

[Deleted.]

(U) As the targeting constraints were moved to lower and lower population levels, the number of chemical fire missions that were allowed decreased as well. A chemical mission as used for this analysis has a broad definition: from targeting a maneuver unit, artillery battery, or command HQ, to attacking supply depots and tactical air bases. The disparity in size of these targets is quite wide. The impact of various targeting constraints on the number and effectiveness of NATO's chemical missions is shown below in Table A-4.

Table A-4. (U) IMPACT OF TARGETING CONSTRAINTS
ON NATO'S CHEMICAL MISSIONS

UNCLASSIFIED					
Civilian Population Constraint	No. Chemical Missions Executed	Pact Military Casualties	NATO + Pact Civilian Casualties ^a	Casualties Per Mis- sion Executed	
				Military	Civilian
2,000	266	3,721	2,560	14	10
10,000	361	7,588	5,120	21	14
20,000	406	7,735	9,201	19	23

^a(U) Civilian casualties inflicted by NATO chemical weapons only.

MANUFACTURING SOURCES SOUGHT

Chairman HATFIELD. The Commerce Department publishes, as you know, a circular called "The Commerce Business Daily." On December 22, 1981—I have a copy of that publication—it displayed a bidding advertisement from the Army searching for manufacturing sources to produce between 2.9 million and 6.1 million pounds, or 3,000 tons, of MPB, which is the raw material one needs to produce DF, as I understand it, one of the two chemicals, the other being rubbing alcohol, being used in 155mm military artillery shells at Pine Bluff. I understand roughly 6 million pounds of MPB is enough to make 1 million—am I getting into any classified material?

Dr. GOLD. I don't think so.

Dr. WAGNER. I don't think so.

Chairman HATFIELD [continuing]. 1,155 rounds. Now, excluding what we have already as a sizable and growing stockpile, and the other binary munitions you wish to make, according to my calculations, this would represent about 135 days of war firing at a rate of 5 percent of all U.S. conventional artillery.

Assuming these facts to be correct, do you expect Congress and Europe to believe that our stockpile requirement does not anticipate forward deployment in Europe? According to Dr. Meselson, who testified yesterday, we would need only 200,000 rounds for a total of 30 days of war.

Dr. GOLD. As you stated, the advertisement specified a production range of from 2.4 to 6.1 million pounds to provide companies some indication of the capabilities required. The actual requirement is somewhat less than the maximum mentioned. I suggest the best thing to do would be to go into a closed session so we can tell you precisely what our stockpile requirements are.

Chairman HATFIELD. All right. We would be very happy to. I agree with your recommendation. I believe that probably most of my other questions relate to security matters. Let me ask just one more from Dr. Meselson's testimony yesterday.

IMPACT ON CIVILIANS

He stated that even 10,000 tons of nerve gas, considerably less than the unclassified figures we have seen, would create a lethal hazard area of 20,000 to 200,000 square kilometers in Europe, killing tens of millions of Europeans. What is our expectation of what would happen to civilians in this area? Some of our witnesses also stated that such extensive use of chemicals would result in either political pressures for surrender or political pressures for escalation to nuclear war. Is this a problem that the administration has dealt with, and should Congress and the administration address this matter in the context of your budgetary requests here?

Dr. GOLD. Let me address the first part of that. I am not quite sure what the question is. With regard to—

Chairman HATFIELD. The impact on civilians.

Dr. GOLD. We agree that chemical warfare would be horrible for civilians. There is no argument on that. Our approach was to insure that we will not have chemical warfare. I would rejoice if we can get a verifiable ban on these weapons. We have had a policy for many years, and this administration I am sure and all future will remain committed to it, to no first use. Again, there is no question that chemical warfare would be a horrible thing for the civilians around. Our approach is to insure that the Soviets do not perceive any advantage from using chemical weapons; and therefore, we believe the threat, the likelihood, the possibility of chemical warfare will be less.

Chairman HATFIELD. I certainly would not in any way question your preferences or anyone else's about hoping that that day does not come. But, of course, let's be realistic. Civilians don't have gas masks. Civilians, and infants and the infirm particularly, don't have protective measures. Hence, the guts of the question really is, What is the level that we have to create to develop the so-called adequacy of deterrence? Dr. Meselson's statement was not so much related to a charge or an inference that the Pentagon is interested in creating civilian casualties as much as the question of the ratio of how many you would fire and for what length or period of time. He claims there is an overabundance in the arsenal that would be built on the basis of your proposed request.

Dr. GOLD. I have made two points on that before. One is that we do not have today the ability to attack the Soviet Union beyond artillery range with persistent agent. That is certainly where we would like to attack them. It is not on NATO soil. If we cannot attack them there, if we cannot attack his airbases, if we cannot attack his supply nodes, if we cannot attack his second and third echelon troops coming up, but he would be free to use chemicals on NATO, he would have an enormous advantage.

We do not have that capability in the stockpile today. It is not a question of arguing whether you need 5 percent of artillery projectiles or 20 percent of artillery projectiles. That is the key critical deficiency in our stockpile and one we will address with our program.

With regard to the number of artillery shells, that is a matter of judgment. As I said, Senator Hatfield, the actual stockpile numbers and requirements I would be happy to discuss with you in a classified session.

Chairman HATFIELD. Let's close this session. But let's not close it before we clarify. I wouldn't want us to be broadcasting to the Soviet Union a wrong signal. I am sure you don't intend to imply here that looking at the total arsenal, looking at all the components of the existing chemical weapon arsenal, that we are without ability and that we have not sufficiency to retaliate. I don't think we want to telegraph that to the Soviet Union, that there may be certain areas of certain components only where you feel there is a deficiency. But let's make sure that everyone in this room and other people who are reporting this have a clear understanding of what you have just said vis-a-vis the Soviet Union.

Dr. GOLD. I would like them to believe that we have sufficient capability, Senator. I am not sure that I can agree with your wording of

that. We have some capabilities. We are vitally deficient in the critical area of being able to deliver beyond artillery range. We have aerial spray tanks which cause the delivery aircraft to be very, very vulnerable.

If you would like an elaboration on that, we have General Tietge here from the Air Force who can discuss the problems of delivering chemical agents in a spray tank versus a bomb.

Dr. WAGNER. Senator, I will bite. I think we have a substantially deficient capability in comparison to the Soviet Union, and that is what worries us with regard to providing incentive for them to actually use these weapons.

Dr. GOLD. Obviously, we walk a dilemma in talking about what we have. On one side, obviously we want to give yourself and the public as much information as they need to make an intelligent choice on this very, very tough issue. On the other side, I would be very happy if we can cause the Soviets to be deterred by broadcasting and advertising the capabilities that we might have.

Chairman HATFIELD. Would you trade them, arsenal for arsenal?

Dr. GOLD. Chemicals, without a doubt. Absolutely no doubt in my mind that I would trade across the board in chemical today, theirs versus ours. They have taken this subject seriously for decades and we have not.

Chairman HATFIELD. You feel you have accurate information to know what the Soviet Union really has in its arsenal? I thought before we had testimony we weren't really sure.

Dr. GOLD. You asked me if I would trade. I do not have accurate information on the precise stockpile.

Chairman HATFIELD. So you would have a grab bag. You would trade blind?

Dr. GOLD. It wouldn't be a blind trade. We have a considerable amount of information across the board. We know what delivery systems he has. We know what agents he has. We know what training. We do not know all we would like to have, as Dr. Wagner has pointed out, in many other areas.

Chairman HATFIELD. Would that be for a first strike or for a deterrent?

Dr. WAGNER. No, sir. We have rejected the first use of chemical weapons. From our point of view, I believe it would be a deterrent. If we actually traded one for one, and they had our deficient capability, I think we would not have use for what the Soviets now have. However, if we could have their capability today that they have, facing the same capability on their part, yes, I would agree, I think it would be something that we would prefer to have.

Chairman HATFIELD. But you don't deny when the Army's toxic chemicals maintenance program is completed that we will still have literally thousands or hundreds of thousands of serviceable nerve gas artillery projectiles and many additional hundreds of thousands of mustard artillery projectiles in our arsenal?

Dr. WAGNER. The numbers are classified, and we should go into that in a closed session.

Chairman HATFIELD. All right. But we have a deterrent force.

Dr. WAGNER. Not sufficient, we believe, to force them into a protective posture and to take the kinds of operational degradations that we feel are required to deter them.

PROGRAM OBJECTIVES REASONABLE

Dr. GOLD. I think the objectives of our program are reasonable. We want our troops to be able to operate in a chemically contaminated environment and under attack at least as well as he can. We are not there yet. We think we can be there in a few years. We also want to have the capability, and he should know that we do, to force him to actually operate in that environment should he initiate chemical weapons.

Chairman HATFIELD. Let me assure you I will be the first to vote aye for any amount of appropriations necessary to keep our personnel protected, to give them the training to know how to handle that circumstance on the battlefield. That is not certainly any question in my mind or of this committee.

I think the question more revolves on the matter we will have to take up in executive session, pertaining to the quantitative and qualitative analysis.

Do you have any questions, Senator Pryor?

Senator PRYOR. One or two brief ones.

EVACUATION AND PROTECTION OF CIVILIAN PERSONNEL

We have, I think, according to figures by the Congressional Research Service, 647,526 either U.S. personnel in western and southern Europe, civilian personnel that are U.S. citizens, and dependents of both military and civilians, totaling almost 648,000 people. Are there any plans whatsoever that the Pentagon or the Department of the Army might have at this time for the evacuation of civilians or any of the civilian personnel or to furnish protective clothing to these people in case of a chemical warfare attack by the Soviets?

Dr. WAGNER. I am not familiar, Senator, with the details of evacuation plans. I am sure there are some.

Dr. GOLD. We do not have plans for protective equipment. There are plans for evacuation. Those plans have been exercised.

Mr. THOMAS. That is correct. There are well-organized plans for evacuation that are keyed to the outbreak of hostilities of any type. But the question of protecting civilians, not just American civilians but also European civilians, is not addressed in any fashion. The fact that the U.S. troops will be fully protected doesn't help the Europeans.

Senator PRYOR. I have just one more question, Mr. Chairman. That was, the request I think from the Pentagon is \$1 billion to create a new generation of nerve gas and about \$1 billion, roughly, to destroy the present stockpile. Are those about correct, those figures?

Dr. GOLD. Yes. I mentioned actually with current technology we estimate it would cost more than \$1 billion to destroy the current stock-

pile. The billion I mentioned is what we think we will spend over the next 5 years.

Senator PRYOR. What do you think you will spend over the next 5 years in the production area of the new binary nerve gas?

Mr. GOLD. The production will probably be about 80 percent of the billion dollars, so production will—

Senator PRYOR. No; I am talking about over the next 5 years.

Dr. GOLD. I am talking about the next 5 years. Our plan over the next 5 years is to spend about \$1 billion on the retaliatory portion of the stockpile. Most of that will go into production. A smaller amount will go into research and development, and a smaller amount into maintenance. I can get you the precise figures, which I don't have. But the bulk of that billion dollars will be for production.

Senator PRYOR. Then for the record, what about the defensive mechanism, defensive gear, gas masks?

Dr. GOLD. We plan to spend, as I mentioned before, over \$4 billion over the next 5 years, including over half a billion dollars next year. The bulk of that money will be in the procurement side. For next year it is about 60 percent procurement, 40 percent research and development. We do not now have today developed in many areas the quality of protective gear that we like. So as the fruits of the R&D efforts pay off, we will see an increasing percentage going into the procurement.

Senator PRYOR. Is there any developing of an antidote or any sort of a—

Dr. GOLD. Absolutely. A large part—I noticed one of the witnesses yesterday indicated that we do not have a program in that area. That is not true. A large part of our defensive R&D area is in the medical R&D. Probably the biggest growth in funding has been in that area. And a significant amount of that is devoted to anecdotes—antidotes. [Laughter.] Anecdotes; that is a whole other area.

Senator PRYOR. Couldn't we basically scrap this whole program should we develop such a, let's say not cure, but a preventive medicine?

Dr. GOLD. If we got an effective preventive medicine and we were sure that it covered the range of agents we have to face; sure.

MEDICAL R&D

Senator PRYOR. How much are you spending on that program, to develop that medicine?

Dr. GOLD. I better get you the precise figures on that. But that is the medical R&D which is the largest growing and probably the biggest area of defense now.

[The information follows:]

In fiscal year 1983, \$107 million is programed for medical, chemical, and biological defense R&D programs. Approximately 85 percent is for the development of pretreatments (preventives) and antidotes. The remainder is for programs to improve medical management of chemical casualties and for personnel and patient decontamination. During the fiscal year 1983-87 period, approximately \$1 billion is planned for these programs, with the percentages remaining about the same throughout the period.

Senator PRYOR. Mr. Chairman, thank you very much. I appreciate it.

Chairman HATFIELD. You are welcome.

SUBCOMMITTEE RECESS

We have a number of other questions we will submit to you in writing for the record. We have now prepared room 1223, which is right around the corner. It has been swept. All of those with a classified rating may go over there.

[Whereupon, at 4:25 p.m. Thursday, May 6, the committee was recessed to reconvene in executive session in room 1223 at 4:33 p.m. the same day.]

EXECUTIVE SESSION

The committee met in executive session at 4:33 p.m. in room 1223, Dirksen Senate Office Building, Hon. Mark Hatfield (chairman of the full committee) presiding.

Present: Senators Hatfield and Bumpers.

Also present: Senator Pryor.

DEPARTMENT OF DEFENSE

STATEMENTS OF:

RICHARD WAGNER, ASSISTANT TO THE SECRETARY OF DEFENSE,
ATOMIC ENERGY

TED GOLD, DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE,
CHEMICAL MATTERS

CHARLES H. THOMAS, DIRECTOR, OFFICE OF SECURITY AND
POLITICAL AFFAIRS, BUREAU OF EUROPEAN AFFAIRS, DEPARTMENT
OF STATE

MORRIS BUSBY, DEPUTY U.S. REPRESENTATIVE TO THE COMMITTEE
ON DISARMAMENT, ARMS CONTROL, AND DISARMAMENT AGENCY

WORLDWIDE REQUIREMENT OF BIGEYE BOMBS

Chairman HATFIELD. Could I just go through several questions to get them out of my hair, at least. Maybe they will cover some of the things.

I want to go back to the life, which the Meselson question raised, about the 20-year life of this thing. But let's do these first, if I could.

The Joint Chiefs of Staff stated in a letter to the Senate Armed Services Committee the following total worldwide requirement for nerve gas artillery munitions of Bigeye bombs. They state, the 155mm GB, [deleted] 8-inch projectiles, [deleted] Bigeye bomb, [deleted].

These are listed, as I understand it, as total requirements, [deleted].

In each of these three categories could you give me sort of a general breakdown between the [deleted] requirements, and are these generally correct for this?

Dr. GOLD. They are generally correct. You are right that more [deleted.] The United States [deleted] in terms of agent tonnage, would be somewhat less than [deleted] tons.

Basically, in round numbers, so we do not get involved in the second and third order figures, the [deleted] requirement is on the order of [deleted] shells and about [deleted] bombs.

Chairman HATFIELD. What would be your basic justification—is this gentleman cleared?

Dr. GOLD. He is OK.

Chairman HATFIELD. I hate to interrupt every time someone comes in. If you people will just sort of take a look, and Jenna, you take a look.

Senator BUMPERS. I will vouch for David over there. [Laughter.]

Senator PRYOR. Mark was worried about me a while ago.

Chairman HATFIELD. If you were to justify the rationale for requiring such a high percentage [deleted] how would you justify it?

Dr. GOLD. The high percentage, I think, fits very well with their responsibilities [deleted.] There are eight corps sectors in the central front of NATO, and the United States occupies two of those corps.

Chairman HATFIELD. That really comes back to my first question I put earlier, Dr. Gold. I didn't use out there the similar quotes I have obtained and collected from [deleted] high-ranking officials in governments of Europe, our allies, about nonacceptance of such weaponry on their soil. You and I know the political difficulties many of those governments face on that question.

Aren't we really moving on a rather [deleted.] It just seems to me—and I am making this very informal. This is not a hearing. I just want to talk off the top of my head. It just seems to me a political policy, not a technical policy but a political policy, that is rather fluid, uncertain, confused, inconclusive.

I had a chat with [deleted.]

POLITICAL CIRCUMSTANCES

[Deleted.] There again, I am just throwing this out. What about the political circumstances?

One of the reasons why we wrote that into the 1981 supplemental report language was, beyond my own personal philosophy about the instrument or the weapon, beyond that, here we are going to launch a \$6 billion program in the next 5-year period.

Dr. GOLD. It is just \$1 billion on the weapons.

Chairman HATFIELD. Well, but it is all part of a package. We are talking about destruct, destroy, and producing certain additional. All right, even let's take \$1 billion. Let's take the most minimum figure. Take \$1 billion.

Dr. GOLD. That is the maximum figure for the weapons. That billion includes producing weapons, maintaining the stockpile. The \$6 million includes all of the defensive and protective measures.

FINANCIAL COMMITMENT

Chairman HATFIELD. All right. But whatever amount. Let's not argue the figure. We are making a financial commitment once we launch into this. That is the bottom line. We are making a financial commitment on the basis of what I consider very inconclusive evidence, or maybe there is evidence that I am not aware of, that such a [deleted.]

Dr. GOLD. There is a real dilemma here in terms of raising this issue right now and the problems overseas. However, the 5-year plan will not even build up to what we consider to be the [deleted.] So at the end of the 1980's, we will have a usable stockpile, that is considerably less than what the JCS considers to be essential for worldwide U.S. [deleted] needs.

Senator BUMPERS. What is that figure?

Dr. GOLD. [Deleted.]

Senator BUMPERS. The larger figure.

Dr. GOLD. The larger figure is in the neighborhood of [deleted] tons. By the end of the decade, if we go at it with the binary program and we are able to maintain those usable munitions in stock, we will have about [deleted] tons in our stockpile.

Senator PRYOR. Wouldn't this billion just buy you [deleted.]

Dr. GOLD. Absolutely.

Senator PRYOR. So about [deleted.]

Dr. GOLD. It will buy about [deleted] of the total worldwide requirement [deleted] right.

Senator PRYOR. That is why I was asking about the billion a while ago in the open session.

Dr. GOLD. If we eventually build up to [deleted] tons, the total cost of the program would be on the order of \$4 billion; right. If we continue building into the 1990's; you are right.

Dr. WAGNER. But I think we are a long way from knowing exactly what that extension of buildup is going to be. Those are pretty rough numbers. But Senator Hatfield's point, I don't think we have still quite addressed it, is—

AMOUNT STORED OUTSIDE THE UNITED STATES

Senator BUMPERS. Let me interrupt, if I may, and ask this question, if the chairman will permit. How much of our present supply is stored outside the United States?

Dr. GOLD. About [deleted] tons.

Dr. WAGNER. Yes, [deleted] tons, and that is a fraction of the total supply.

Senator BUMPERS. Are those artillery rounds?

Dr. WAGNER. [Deleted] sir.

Senator BUMPERS. [Deleted.]

Dr. GOLD. When I say "outside of the United States," I didn't include Johnston Island. We have them in two locations, Johnston Island and Germany.

Senator BUMPERS. I meant in Germany.

Dr. GOLD. What we have there is [deleted.] It amounts to about—

Senator BUMPERS. That is classified information; is it not?

Dr. GOLD. That they are stored in Germany; no. The fact of how many we have, absolutely.

Senator BUMPERS. You are telling me the fact we have chemical agents stored in Germany is not classified?

Dr. GOLD. That is correct. That is known.

Dr. WAGNER. It is known in Germany.

ALLIED ACCEPTANCE

Mr. THOMAS. That gets at the question of allied acceptance of these weapons.

Senator BUMPERS. I have been closely guarding a secret that wasn't a secret. [Laughter.]

Chairman HATFIELD. And probably telling the secrets that aren't supposed to be told. [Laughter.]

Senator BUMPERS. Probably telling some; that is right, that I didn't think were secrets.

Dr. WAGNER. Senator Hatfield, the point you are after is, is it going to be a credible deterrent to the Soviets if we have them here. And even if we say we can lift them over there, nobody will accept them. I think that is your point.

Chairman HATFIELD. That is my point.

Dr. WAGNER. Look, I think that there is some risk in that position. But I think the allies might be very much more willing to accept them when the chips are down and the alternatives are all pretty black. If they felt that, in fact, as in World War II, the presence of those agents in Europe, would deter the use of chemical weapons, I think they might be much more willing to accept them during a crisis and during the beginning stages of a conventional war.

Chairman HATFIELD. I wouldn't challenge that assumption.

Dr. WAGNER. And I think we can get them there.

Chairman HATFIELD. The only thing is, if the Russians should launch in Western Europe a move of some kind of chemical weaponry and with a time lag between the ability to retaliate with similar weaponry, what does that pose in terms of strategy?

Dr. WAGNER. Let's go into that, because the time lag may only be a [deleted] or something. In fact, there are some weapons there today, and perhaps I think maybe [deleted] but maybe not, and those might fill in the first [deleted].

I know that Dr. Meselson has raised the issue of the bulkiness and the untransportability of the binary weapons. I think our feeling—and you guys correct me if I get the numbers wrong—is that with something on the order of less than [deleted] percent of the airlift capability that we have, we can get enough to keep up for a [deleted] with the usage that we believe is needed to keep them in protective equipment. After that, sea transport begins to be able to fill in. And we are talking about sustaining for, at the rates that Ted mentioned, something on the order of [deleted] days. And that number, I believe, is a sensitive and classified number.

Chairman HATFIELD. Don't you agree, though, also, if the Russians feel they are going to make this kind of a launch of such weaponry, that that is but a preliminary to a nuclear launch?

Dr. WAGNER. I don't really believe that.

Chairman HATFIELD. You don't think that is—

Dr. WAGNER. I think if they have that advantage there, they might make use of it before escalating to nuclear weapons—I think it is a lot bigger risk to go to the nuclear level. I don't think they necessarily couple those two together.

Chairman HATFIELD. Boy, it seems to me that once they are desperate enough to launch a chemical, that there isn't much threshold left.

Dr. WAGNER. I don't think they are desperate in Afghanistan in the same sense that I think you meant it in that question, and they are using them there.

Chairman HATFIELD. But they are not facing—in Afghanistan, what do you have, a group of tribes. You don't have a counterforce in Afghanistan.

ADEQUATE COUNTERFORCE SOUGHT

Mr. THOMAS. That is what we are asking for, adequate counterforce.

Chairman HATFIELD. But the point is I am saying we already have a counterforce there in terms of other weaponry.

Mr. THOMAS. You would prefer to use nuclear weapons as a counterforce?

Chairman HATFIELD. No; I am not suggesting that.

Mr. THOMAS. That is the usual response.

Chairman HATFIELD. No; I am not raising that. I am not putting it in that context. I am not putting it in that phrase. What I am saying is that it seems to me that if they are aware that we have a deterrence, as you say we have, and as I believe we have—now you may feel it is inadequate, but the fact is we still have a deterrence—that they are going to launch that, knowing we have a deterrence that the Afghans don't have. It seems to me that chemical weaponry is a desperate move.

Dr. WAGNER. I disagree. I think today it is a move that they can make with some confidence because they gain an additional advantage from it because of the disparity between our two positions. Even if we responded with the capability that we have—

Chairman HATFIELD. What is the advantage of launching a weapon that is going to hit the civilian population more than it does the military?

Dr. WAGNER. I don't see that there is much advantage in that, but that doesn't seem to matter a wit to the Soviets.

Chairman HATFIELD. That was one of the great disadvantages in both World War I and World War II with the German occupations and the problems in dealing with civilian populations.

Dr. WAGNER. Yes.

Chairman HATFIELD. And the thing that raised the ire of the world's opinion, brought America—well, let me go from that numbers thing.

JCS ARTILLERY REQUIREMENTS

According to the U.S. Army data, we now have [deleted] serviceable 8-inch and 155mm nerve gas military projectiles and we will have [deleted] at the end of the Army's scheduled maintenance plan. Would it be correct then to conclude that we could meet the JCS artillery requirements [deleted] without production of any binary artillery munitions?

Dr. GOLD. Your larger figure is high by a factor of about two. It includes almost [deleted] projectiles which are not scheduled for maintenance. It also includes almost [deleted] projectiles which are not the appropriate choice. The Meselson testimony is based on 5 percent. If

the military felt that all you had to fire was 1 out of 20 to get the desired effect, then the numbers would not be at issue. Again, our judgment, the military judgment, is a few times higher than that and, therefore, we are talking in the neighborhood of [deleted] rounds [deleted.]

Chairman HATFIELD. So the base line is really what we are changing here, not—

Dr. GOLD. With artillery. The argument on numbers, we are doing all we can to maintain. We have about [deleted] 155's that are ready or repairable [deleted.] We are doing all we can to get the repairable into ready condition. I think we have something less than [deleted] of the 8 inch. So your total numbers are right, including the [deleted] rounds. The difference on the numbers comes from the judgment of what is effective on the battlefield. [Deleted.]

Again—and I don't want to sound like a broken record on this—I bring up the question of the bomb. To my view that is the highest priority for our retaliatory forces. Our desire is to use weapons not on our territory, but in his territory, to use weapons where it hurts him the most. We do not have an effective capability to expose him to the same encumbrances in depth as he can force on us today. The bomb redresses a qualitative lack in the stockpile.

STOCKPILE SUFFICIENCY

Chairman HATFIELD. Let me come down then to reiterate and to just clarify my own mind. If we were producing for U.S. forces period, tell me the sufficiency of our stockpile, after the maintenance plan has been operative, in that context.

Dr. GOLD. It would provide about a [deleted] in round numbers. I can have Colonel Tengler from the JCS answer that.

Chairman HATFIELD. You would say we would be [deleted] shy?

Dr. GOLD. In artillery, approximately.

Dr. WAGNER. For United States only.

Chairman HATFIELD. I am talking about United States only.

What is the measurement you relate that to in terms of the enemy or the adversary or whatever?

Dr. WAGNER. Enemy.

Dr. GOLD. In terms of what he has in his stockpile?

Chairman HATFIELD. No. We are [deleted] shy. We have a certain level we are trying to achieve. That level has to be measured against something.

Dr. GOLD. If we had a credible deep target capability, and then you could argue whether this missing [deleted] is critical and what part of the diminishing return slope you are on. I keep going back to the point [deleted] the lack of being able to hit him in depth, the fact we cannot do it, that he can do it to us. That can be decisive on the battlefield.

Chairman HATFIELD. Are you talking about a type?

Dr. GOLD. Yes. I am talking about the bomb.

Chairman HATFIELD. You are talking about the bomb here.

Dr. GOLD. Yes.

Going back to our artillery, if we fired every 1 in 20, that would be, on the average, firing a round from a gun every [deleted.] The kinds of agent that you use close to your own lines are the nonpersistent type. That doesn't last for very long, depending on the weather. So he would be forced to put on his mask. If he had the detection capability, and the Soviets do, he could be operating without protective gear a good part of the time.

We cannot tell you in precise terms what, obviously, that would mean in an actual battle. Thankfully, nobody has fought this kind of war in recent times. But the numbers we are talking about, the [deleted] percent would be enough to essentially force him into protective posture, make him stay in protective posture, and also handle all of the extra tasks he would have to do on a contaminated battlefield.

To me, it is a tremendous burden that we would be putting on our men and women in uniform to tell them you go out and fight in this equipment, even the improved equipment. It is going to hamper your vision and hamper your dexterity. I tried to fire a gun with that stuff on. I am probably the wrong example, but it is very tough. You have to wear the protective clothing, which even in moderate temperatures, if you are getting above 60, 65 degrees, and if you have strenuous work, tremendously builds up a heat burden. Boots further restrict your maneuverability.

Chairman HATFIELD. So does the adversary.

Dr. GOLD. Only if we force him to.

Dr. WAGNER. Only if you keep him in that. That is why you do not want to give him 5-hour gaps.

Dr. GOLD. We are trying to search for the smallest stockpile that would force him to live with whatever conditions he can put on us. It is not a question of stockpile size. I don't think there is an arms race in here. Somebody mentioned today, would we accelerate an arms race. I don't think there is question of any political significance of these weapons. Our stockpile requirements are driven by targets, not by the amount of munitions he has.

PRESIDENT NIXON'S MORATORIUM

Chairman HATFIELD. Let's go back to when President Nixon put the moratorium on us. What were the relative situations then and what do we have today? Make those contrasts.

Mr. Nixon, let's face, was "We are going to be No. 1. By golly, we are going to show the Soviets." So I don't think you can—

Dr. GOLD. I think the relative balance was closer then. We had a very active program.

Chairman HATFIELD. Do we know?

Dr. GOLD. I think we know. The relative balance was closer. We had an active program. What has happened in the intervening 13 years is we stopped our program. The Soviets have been allowed to continue.

Chairman HATFIELD. How do we know about the production of the Soviets in that 13-year interim?

Dr. WAGNER. As to production in R&D and weapon development, they have, in fact, I think done a lot more. Every new medium-range battlefield missile they have brought out has had a chemical weapon capability.

Senator BUMPERS. How do you know that?

Dr. GOLD. That is a higher level than this room, and again, if there is an interest, we can get a briefing.

Senator BUMPERS. I think it would be worthwhile, Mark.

Chairman HATFIELD. I do, too. It is really the crux of the whole issue I see here at hand.

Dr. WAGNER. I am not actually—

Dr. GOLD. I am not sure. But we can provide the information we have.

Chairman HATFIELD. It is the crux in the sense all of a sudden in 13 years here comes an administration that says we have to crank up this program that a hard-line administration, the guy that is tough—

VERIFIABLE ARMS CONTROL LACKING

Dr. GOLD. If we had achieved verifiable arms control—our moratorium was in expectation of having verifiable arms control. That would have been a superb and a perfect answer for the problem. But it was in the absence of that and the fact the Soviets continued their program and we essentially—

Chairman HATFIELD. You mean we put a moratorium on that without having a quantitative analysis of comparative strengths on an expectation of something to happen down the road? That is not Mr. Nixon.

Dr. WAGNER. I think at the time there was a relative comparison, and I believe the intent—remember, that was about the same time SALT was going on, SALT I. And at that time I think we thought SALT I was going to solve the offensive missile problem; the Soviet program was going to stop. There may well have been a similar expectation about the Soviet chemical program.

Chairman HATFIELD. I wish you would go back in the records to find it, because I just can't conceive Richard Milhous Nixon throwing in the chips on anything.

[The information follows:]

I have been informed that, indeed, President Nixon did initiate unilateral disarmament of biological weapons. The assessment was made that the utility of these weapons was greater as an arms control level than as a war fighting instrument. The cessation of chemical weapons production was originally due to desire to avoid the costs and risks associated with further unitary munitions production in expectation that binary munitions would be produced in the early to mid 1970's. Open-air testing of chemical munitions was effectively prohibited by law, reflecting concern that sufficient precautions were not being followed.

Belief in detente based on international agreements, even though unverified, led to U.S. ratification of the 1925 Geneva Protocol and the Biological Weapons Convention and to the decision not to resume production of chemical weapons, as well as to decisions to reduce all emphasis upon chemical warfare preparation.

The change in situation between then and now is not in the threat capability so much as it is in the perception of the Soviet threat capability gained since the 1973 Arab-Israeli War.

CARTER ADMINISTRATION TRIGGERED PROGRAM RESURGENCE

Dr. WAGNER. Let me come back to another point you triggered a thought on. That is that this resurgence in the program started before the Reagan administration. I wasn't in this job at the time, but I was on the Defense Science Board, and DOD had asked the Defense Science Board 2½ years ago, almost 3 years ago, to look at this chemical warfare program. That was during the Carter administration. I think it became apparent that there was a growing asymmetry a number of years ago during a time when President Carter was really trying to achieve—

Senator PRYOR. I remember in 1977 there was a movement.

Senator BUMPERS. Yes. What did Harold Brown say yesterday morning on this, David? He indicated that he probably would be going along the same line they are, didn't he? We visited with him for an hour or two yesterday morning.

Could I change the subject a moment?

Chairman HATFIELD. Please, just interrupt at any time.

Senator BUMPERS. In the hearing a moment ago, I don't know whether it was Dr. Gold or Dr. Wagner, said that one of the things he wanted to do was to get beyond artillery range. I had two questions.

No. 1, why? Number 2, what are you planning to build and how are you planning to deliver that beyond artillery range?

Dr. WAGNER. Maybe we should both try it.

The Soviets have a very structured, almost formal way of reinforcing their forces. They operate in echelons. A company will have a second echelon company. A division will have a second echelon division. A corps in the army in front, all of their units will have second echelons, and then further back they will have perhaps a third echelon. Their doctrine relies a lot on bringing those deeper echelons forward and applying that reinforcement, fresh reinforcement. At just the right time they throw their first echelon vigorously in and then rely on the next one coming up.

Many studies, not so much on chemical weapons but on theater tactical nuclear weapons, have shown their effectiveness is greatly impaired if you can interrupt their logistics and attack their deeper targets. So I think that is, in my layman's terms, the military's reason for wanting to be able to attack those deep targets. And also I think he has the capability in spades to attack the similar structure for us.

The mechanism that we are proposing today is aircraft delivery of the Bigeye bomb, which is a binary program that will, if the program works out as we believe it will, come into production a few months later than the 155mm binary shell. There is some controversy, of course, over whether or not bombs can actually be delivered very effectively by aircraft, considering the very intense air defense. It is certainly true that today the spray tank capability we have, as I think Ted mentioned, exposes the aircraft devastatingly.

Senator BUMPERS. Those are very vulnerable aircraft, aren't they?

Dr. WAGNER. Certainly, with spray tanks they are.

General Tietge may want to comment on this further.

General TIETGE. My name is Jerry Tietge. I am Deputy Director of Operations, Headquarters, USAF. I would be glad to address that.

AIR DELIVERABLE MUNITIONS

If we look at our current stockpile today, as it pertains to air deliverable munitions, we really only have [deleted.] That is the MC1 bomb. We have [deleted] of those. They are nothing more than a 750-pound bomb. Our iron bombs, that have a filler in there that is a non-persistent nerve agent, we could carry those right now on any aircraft basically that can carry a 750-pound bomb.

The problems with them are that to hit the targets, deep interdiction type targets, we can get there and deliver them, but the effectiveness of them being a nonpersistent nerve agent is the area that they cover and the length of persistency means that all they will have to have is a mask to cover the respiratory tract for about 15 minutes. Before I can get back to my base I left from, they are back in the normal environment. That is a pretty high risk to take when you figure your way all the way through the defenses you have to go through to deliver your mission and then come back.

Dr. GOLD. Excuse me. These bombs, by the way, are part of what we identified as our potentially useful stockpile. So we weren't eliminating those. Those are in the part we are trying to keep.

Dr. WAGNER. The yellow part on the chart.

Dr. GOLD. They are about one-third of the yellow part.

General TIETGE. It would have some applicability right close to the front lines if for some reason you had some troops in the open, it would help the Army to deploy them against the enemy, if they were, say, unprotected—especially in the area you want to move into, because the nonpersistency would allow you to move in there.

But other than the front line and close-in area, although you can deliver them, and we have [deleted] of them, when you get there, the damage you do or harassment you do or casualties you inflict would be very minimal for that expense.

Now, we have the TMU28 spray tank. [Deleted.] That has a persistent nerve agent which can keep the base tied up, if you deliver them in sufficient numbers, for a period of 1 to maybe 3 days, depending on weather conditions which pertain to it.

But the problem with that weapons system is that while it has that capability that we would like to have to keep that base buttoned down, there is the problem with the delivery mode of it. [Deleted] and your chances of survivability, of course, are greatly decreased.

So for that reason, while that gives us the capability for persistent agent, in the total context of survivability it is not very attractive. Of course, we only have [deleted] of them to begin with. So the Bigeye gives us a capability of the correct agent and it is deliverable. [Deleted.]

Senator BUMPERS. You wouldn't deliver it from a high altitude.

General TIETGE. Unless you are in a benign environment, then you

could. In fact, you could put them on a [deleted] feet depending on the type of target. But the type of warfare we are looking at in the central region; no. You do the same tactics as with the conventional weapons today. [Deleted] and it has the synergistic effect then when you do hit them with the chemical that you get, of course, greater effect than you would have otherwise.

So that is the capability the Bigeye would give us as far as retaliatory capability that we don't have today. Of course, not to mention the storage and the handling and those types of things.

PROLIFERATION

I know one question you asked, Mr. Chairman, had to do with the proliferation. Of course, we are very concerned, as we are with our nuclear weapons, which we guard very carefully. I might say from a service standpoint, the degree of security we provide our chemical munitions is the same degree we provide our nuclear weapons. Of course, the advantage there again of a binary is you store them; you don't store both of the components together. You could have the bomblet here and the ballonet that has the other mixing device in it under a very tight security type situation in which you could put the degree of security on to try to ease that fear we always have.

Senator BUMPERS. Incidentally, a slight digression, what is the range of the MLRS? Does anybody know?

Dr. WAGNER. I don't know now.

General TIETGE. [Deleted] kilometers.

Senator BUMPERS. [Deleted] what?

General TIETGE. About [deleted] miles.

Senator BUMPERS. Why wouldn't that be a suitable delivery system?

Dr. WAGNER. It may be. It is close to the front. It could be a very suitable delivery system. We have research and development looking at potential warhead advantages. It still would not address, again as I keep saying, the most pressing problem about being able to pose a threat in depth.

Senator PRYOR. I read an article on the cruise missile being utilized for this purpose. Is that real or is that just—

Dr. WAGNER. I suspect somebody is looking at a number of different possibilities.

General TIETGE. As a follow-on, we would look at any conventional standoff weapon that would have the capability.

Dr. WAGNER. The weapons that look more attractive to me, if we continue to have a need for chemical weapons, are the MLRS which essentially extend the range of artillery and matches his very formidable rocket launcher capability and some standoff air delivery weapon. Lack of standoff capability is a problem with all of our conventional air-delivered ordnance today. We will need a capability so our pilots don't have to penetrate very sophisticated anti-air defenses. That is a personal view where I think our future R&D priorities would go. If only chemical weapons were used, they might not be particularly effective on the battlefield. The advantage comes in when they are used in a synergistic

way with conventional ordnance, particularly against an opponent that cannot fight back that way. A combined conventional/chemical attack on an airfield in which conventional munitions would be used to crater the runways, disrupt operations, and where the maintenance crews are forced to go out and work and exist in full protective equipment, while we are trying to repair runways. The Soviet Union shouldn't be allowed to be able to inflict that on us without knowing that if they do that, their airfields would have to operate under the same conditions.

Senator BUMPERS. Right now we have codes, we have unbelievable safeguards against the use of nuclear weapons. I mean, this has to be by a President's order. We all know, none of us know precisely, I guess, what happens, but we know it is very complicated and detailed.

What kind of a failsafe system are we going to have on the use of these weapons since we have not announced, we have not rejected the first use of them? How would we decide—

Mr. THOMAS. We have rejected. We have definitely rejected first use. That has been our policy since 1925.

Senator BUMPERS. Of chemical warfare?

GENEVA PROTOCOL PROHIBITS FIRST USE

Dr. WAGNER. Yes, sir. Signing the Geneva Protocol does that.

Mr. THOMAS. No question on that.

Chairman HATFIELD. 1975.

Dr. WAGNER. Chemical weapons don't have the fancy gadgetry built in. [Deleted.]

Senator BUMPERS. Some field commander could give the order. That is one of the things that disturbs me.

Chairman HATFIELD. I think that is the point. The field commander can make that decision; can't he?

Dr. GOLD. No. It takes Presidential authorization to use chemical weapons.

Senator BUMPERS. But if they are in the field, there isn't anything to keep them aberrational—

Dr. GOLD. You are right. We do not have particular devices on the weapons themselves as we do with nuclear weapons, but there is very extensive site security, very similar to the nuclear weapons.

Chairman HATFIELD. Compared to the nuclear, as far as the question relating to the President and the heads of units or whatever, where do we find this?

Dr. GOLD. The authorization procedure is very similar. The release and authorization is very similar.

Chairman HATFIELD. Could the President in an outbreak of hostility in effect say, "I grant authority for any field commander that once there is evidence that the enemy is using this, that he has the right to retaliate"?

Dr. GOLD. He could in an extreme case. I think it is much more likely he would—

Dr. WAGNER. I would doubt he would do that.

Chairman HATFIELD. What would be the likely scenario?

Dr. GOLD. Let's turn it over to Colonel Tengler from the JCS.

REQUEST AND RELEASE PROCEDURES

Colonel TENGLER. Mr. Chairman, to address that question, as mentioned, request and release procedures that are outlined for nuclear weapons, there are similar guidelines for the request of the use and the termination of the use of chemical weapons.

The commander has the authority to request the use and the President has the authority to authorize the use. The channel that is covered is—let's take NATO, for example, and let's take the Fifth or the Seventh U.S. Corps doing the requesting.

His request would go through SACEUR headquarters since our forces would have been chopped to NATO in a NATO war with the Soviet Union. SACEUR, General Rogers, would request the President, under SACEUR's release procedures, for use or authority for use, at which time the JCS would recommend through the Secretary of Defense to the President what he should do, at which time the President would make his final decision. We would also look at the constraints portion of that request message as to the number of weapons adequacy, the collateral effects, to include danger to civilian populations in and around the area of use, and then if the President did authorize the use, those constraints would then be forwarded to SACEUR and then, using his communications, would go to the subordinate NATO commands under him.

Chairman HATFIELD. You know what it sounds like to me? It sounds like we don't need forward deployment. [Laughter.]

Dr. WAGNER. It's probably longer to obtain release authority.

Chairman HATFIELD. After you do all of that, they can ship them from Johnston.

Dr. GOLD. That has been said in the nuclear arena for years and years.

Chairman HATFIELD. I know what you are describing. I am not in any way demeaning that procedure. In fact, I am glad to have that procedure. But I was worried a while ago about forward deployment. I don't know that I need to be worried by the time it goes through all that.

Senator PRYOR. I hope it wouldn't be as complicated as the budget process. [Laughter.]

Colonel TENGLER. Sir, if I could say something off the record.

Chairman HATFIELD. This is all off the record.

[Discussion off the record.]

Chairman HATFIELD. Maybe we could write into this clearance for the chairman of the Appropriations Committee for the House and Senate. That would add a nice dimension. [Laughter.]

Can we go back to the life of the weapon? You were briefed on Dr. Meselon's testimony?

Dr. GOLD. Yes. I also talked to him as well.

Dr. WAGNER. Yes.

Chairman HATFIELD. As I recall, correct me if I am wrong—Dale, did you have some more questions?

Senator BUMPERS. No, thank you, Mark.

Chairman HATFIELD. As I recall, he indicated about a 20-year life, did he not, in yesterday's testimony?

Senator PRYOR. I think that is correct.

Chairman HATFIELD. He said something about the present stockpile had a much longer life in making the comparisons between the binary weapon and the existing weapons program. Are you aware of that statement?

Dr. GOLD. I am aware of his statement. Let me make a brief comment on that and then turn it over to Bill Dee, the Munitions Chief from the Chemical Systems Lab, where Saul Hormats came from before, to go into a little more detail.

There is absolutely no doubt that maintaining and having confidence in a binary munition is greater than the unitary. You can go out, with the simulants that we have, with confidence go out and test fire the round.

With the current munitions that are in stockpile, they have been there for decades. Since we cannot go out and test fire those, there is increasing concern about what is happening to them. Many of the things we have been talking about have been questions of judgment, whether you need 5 percent or 20 percent artillery round.

STOCKPILE DETERIORATION

There are a couple of factual things that are not a question of judgment which we can put on the record. One of them is whether the stockpile is deteriorating or not. Professor Meselson said it is absolutely not. It is. We have evidence that the stockpile is deteriorating although we are not saying that is the major cause for going ahead now.

Chairman HATFIELD. What do you mean by deterioration?

Dr. GOLD. I will tell you shortly.

Going from 100 percent of our stockpile to the 10 percent we consider usable today had nothing to do with deterioration. It had to do with bulk storage where we had no munitions for it. It had to do with rockets we have no launchers for. It had to do with weapons that are going out of the inventory. The deterioration question comes up with regard to one issue only: What is the expected longevity of the artillery shells?

We have evidence in the nonpersistent agents, the GB in the 105's and the 155's, that the amount of agent in the shell has gone down approximately 15 percent in the smaller and older 105's, and 8 or 9 percent in the 155's.

Senator PRYOR. What do you mean by "gone down now"?

Dr. GOLD. When the 105's were loaded, they were about 89 percent pure. Now they are 75 percent pure.

Chairman HATFIELD. Is that evaporation, leakage?

Dr. GOLD. I will turn it over to the chemical expert, but it is decomposition.

Dr. WAGNER. Chemical reaction.

Dr. GOLD. It has a marginal effect on the——

Chairman HATFIELD. It is not creating the danger the people perceive like in some of the cannisters?

Dr. GOLD. No.

Chairman HATFIELD. That Senator Garn would be willing to go in and be seated in. [Laughter.]

Dr. WAGNER. We read that.

Dr. GOLD. He has more courage than I do.

Chairman HATFIELD. I have a list of people to put in there. [Laughter.]

You wanted human testing; I will give you a list for it. [Laughter.]

Dr. GOLD. We don't want human testing. There is decomposition of the agent. There is also a corrosive effect on the metal parts. What we are concerned with is eventually the firing safety of these things. When you put these things back in the artillery and they are subjected to the very high stresses of firing, could there be an eventual problem with it? We have a program ongoing——

Chairman HATFIELD. Such as what? You mean high explosives?

Dr. GOLD. Yes. The environment of an artillery projectile is very severe.

Dr. WAGNER. 10,000 g's.

Dr. GOLD. When it is fired from the gun. It isn't when it is in storage.

There is another argument on the status of the stockpile today. Professor Meselson says that all of our 8-inch and 155's are still in code A, which means we have said their effectiveness is still acceptable. That is right. The code is based on agent purity and visible shell condition. But at the same time we have observed deterioration, as I said, on the order of 10 percent. Some 105's, however, have gone below code A. I am not concerned about the loss of 105 projectile effectiveness because we plan to pull them out of the stockpile anyway. However, the deterioration does have implications for the longevity of the rest of our stockpile.

I will turn it over to William Dee who is Chief of Munitions at CSL. He can go into this to your heart's content.

Chairman HATFIELD. I think we want to wind up. Let's make this the last question. You folks have been very generous already with your time.

EXTENT OF DEGRADATION

Dr. DEE. First let me state that the material that was put in the stockpile wasn't 100 percent pure in the first place. When we manufactured VX, for example, its purity ranged normally from 91 to 92 percent. GB ranged anywhere from 79 percent up to about 92 percent, depending on when it was made.

All of these agents are degraded very significantly by moisture. A good example of that is a tenth of a percent of moisture in a VX. In

this case, agent purity would go down 10 percent in a day. If I put 2 percent of moisture in VX, it would be completely gone in the same day. So it only takes a very small amount of moisture to trigger this kind of deterioration.

Basically what we are really talking about is that a little bit of that degradation is present in all cases. Also, it is a catalytic reaction. The more degradation products that are present in a munition, the more it is going to have, and the reaction increases in speed. So what we see is that the purity will go down slowly. When the amount of impurities in the agent within the projectile reaches a certain level, the rate at which the degradation reaction takes place increases significantly and the agent purity drops at an increasing pace.

FUNCTION OF STABILIZERS

In order to counter the reactions, stabilizers were put in the projectiles. These stabilizers tie up acids and moisture. They keep the moisture or acids from reacting with the agent and prevent the formation of significant quantities of breakdown products. They don't completely stop this deterioration reaction, but they slow it down. They slow it down significantly while they are present.

When the stabilizers are used up, the degradation reaction is free to proceed because the agent is no longer stabilized.

One of the things concerning us most about the condition of the stockpile, when I look at the analysis, is that in most instances the stabilizers are very nearly gone. The agent isn't below the usable percentage, but I really don't know how long it is going to stay that way. I think we have been in the level portion of the degradation curve and we are about to go in the falling portion of the curve. The degradation is going to vary from munition to munition.

I have looked at some of these recently. In some instances in the stockpile, the same lot of agent in one munition may be 80 percent, and 79 percent, 75 percent, and 50 percent in others. There are not a whole lot of these, but it does indicate that degradation is occurring. It is happening and the entire stockpile is going in that direction. I would expect, as the stabilizer is utilized, we are going to see it more and more, and very dramatically. Again, it is going to vary from munition to munition. It is going to be more serious in the smaller munition, such as the artillery shells, because of a larger volume to surface ratio in these munitions. They were harder to clean and it was more difficult to get moisture and cleaning acids out of them.

That is, I am afraid, where we are. Yes; we have a usable stockpile today. I don't know what we will have tomorrow.

I might add that the byproducts of the reaction I described are acid materials and they are going to cause corrosion. The serious problems with corrosion, with cracking of the wells, with leaks, are going to increase in these materials.

One of the acids that is formed when GB grows on hydrofluoric acid. If you are familiar at all with hydrofluoric acid, you realize that it is a bad apple with respect to deterioration. With the VX it is mercopton. It

is a bad apple with respect to cracking. I think we have a problem concerning firing safety and we better face up to it.

Dr. WAGNER. Senator, Dr. Dee is in some ways for this hearing the analogue to the directors of the nuclear weapons laboratories in the hearings you held some weeks ago. I wonder, is it appropriate for me to ask him a question? I would simply ask you whether you have any reservations about the binary program and their durability and buildability and all of that kind of stuff.

I have never met him before so I don't know what the answer will be, although I think I have a good guess. [Laughter.]

Dr. DEE. The same problems really don't exist. We are really starting with a different base with the binaries. Well, there are two types of binaries. One is a binary V agent and the other a G agent. There are different reactions, and they are relatively simple. All of these materials are storable. Not only are they storable, but they can be very easily replaced if you have a problem with them.

Senator PRYOR. Would you have the same chemicals, et cetera, in the Bigeye as you would have in the artillery?

Dr. DEE. No. The chemical in the Bigeye is a material we call a transester. It is an organo phosphorus ester. You react sulfur with it.

Senator Pryor. But the Bigeye is lethal.

Dr. GOLD. They are both lethal.

Dr. DEE. They are lethal weapons when activated.

Senator PRYOR. One of the articles in the paper today said the Bigeye was nonlethal. I thought I had missed something.

Mark, I want to thank you for letting me participate. I have been the worst critic of all of these folks in this room. I have been their adversary and all like that when they talk about missiles, and they will all say that Pryor said all that.

Chairman HATFIELD. Don't embrace that.

Senator PRYOR. I really appreciate their cooperation. They have been totally frank with us. I thank you for having them here.

Chairman HATFIELD. I am very grateful to you and we appreciate your participation. I don't want to prolong the session any longer. I would like to be able to do a little thinking and reflection on what I have heard today and possibly get back to you with some followup and further briefing.

Dr. WAGNER. We would be happy to.

Senator PRYOR. Thank you all.

Dr. GOLD. Thank you, Senator Pryor.

Chairman HATFIELD. If you could give us those responses to our written questions as quickly as possible, it would help me in the review process and the digestion of all of this.

Dr. WAGNER. OK.

COMPARATIVE LONGEVITIES BETWEEN TWO BINARY WEAPONS

Chairman HATFIELD. Before we adjourn, could I just get again that bottom line on those comparative longevities between the two weapons? You are saying that Dr. Meselson was in error——

Dr. GOLD. Yes.

Chairman HATFIELD. In giving the 20-year life, 25-year, whatever it was, to the binary weapon. What is the comparative life again between the two? How long a life?

Dr. DEE. How long will the binary weapon last?

Chairman HATFIELD. Yes.

Dr. DEE. To be quite honest with you, 20 years is a very arbitrary figure. We really don't know. We have tried to do accelerated tests and the accelerated tests indicate something on the order of, I believe, about a 98-year life. I don't want to extrapolate that. I don't quite believe that.

Dr. WAGNER. By accelerated tests, we mean trying to speed up time by raising the temperature.

Chairman HATFIELD. I understand. But you are saying in addition to that, the maintenance and security, that you have a much simpler ability—the ability to do that is much easier in the binary than in a unitary system?

Dr. DEE. Yes. For example, you have a cannister—

Chairman HATFIELD. Replacement or refilling or whatever the word should be.

Dr. DEE. The expensive part of the munition is the exterior metal shell. If you have a, quote, bad cannister and something did go wrong, the cannister is about a \$20 or \$25 item, as opposed to a \$500 shell. It is considerably easier to service and easier to replace.

Chairman HATFIELD. It has been very helpful. Thank you, gentlemen.

Dr. GOLD. You are welcome.

SUBMITTED QUESTIONS

Chairman HATFIELD. Before concluding the hearing, the committee will submit to you additional questions which we ask you to answer for the record. They will be inserted at this point.

[The following questions were not asked at the hearing, but were submitted to the Department for response subsequent to the hearing:]

STATUS OF CHEMICAL ARTILLERY NERVE AGENT MUNITIONS STOCKPILE

Question. Are these figures for the current chemical artillery munitions stockpile and the planned (i.e., renovated) chemical artillery stockpile essentially correct?

Answer. The current status of the chemical artillery nerve agent munitions stockpile is shown here:

Calibre/Agent	Ready for Issue	Repairable	Total
<u>8-inch</u>			
VX	[deleted]	[deleted]	[deleted]
GB	[deleted]	[deleted]	[deleted]
<u>155mm</u>			
VX	[deleted]	[deleted]	[deleted]
GB	[deleted]	[deleted]	[deleted]

With respect to the number of nerve agent 105mm munitions, there are approximately [deleted] that are considered ready for issue. However, these as well as those indicated in the maintenance plan offer little operational utility. These munitions are among the oldest in the chemical artillery projectile stockpile and have shown the greatest amount of deterioration. As an example, average agent purity has dropped ap-

proximately 14 percent as determined by our surveillance program. We know that the products of agent deterioration are highly corrosive to metal which makes the utility of any of these projectiles suspect.

Question. Approximately how much will it cost to accomplish the projected 16-fold increase in the number of chemical artillery munitions scheduled in the Army's Toxic Chemical Munitions Maintenance Plan?

Answer. First, let me clarify the maintenance plan and its purpose. This plan was developed to determine the fiscal and resource requirements necessary to maximize the utility of all potentially useful munitions in the existing chemical agent stockpile. This plan, and it is exactly that; a plan, does not mean that all of the munitions can be renovated. It is an estimate only of what might be possible. Actual maintenance of the various types of munition can proceed only after we have taken the actions necessary to confirm that a munition can be upgraded. We know the stockpile is deteriorating but have been unable to test fire the munitions in it. Consequently, we have established a surveillance program to evaluate the munitions, within existing constraints, as to their present and future serviceability prior to initiating a maintenance effort. In this regard and to enhance the limited deterrent capability of the present stockpile, we established, as first priority, the evaluation and renovation of 155mm and 8-inch nerve agent projectiles. This program could provide for the renovation of a maximum of [deleted] nerve agent projectiles, which is estimated to cost approximately \$28.3M through FY 1988.

Question. What is the rationale for bringing [deleted] additional mustard rounds into serviceable condition? Is mustard still a useful agent?

Answer. Plans to upgrade mustard munitions have been deferred. Mustard may be a useful agent for forcing long-term, restrictive decontamination and protective measures on rear area targets. However, due to its persistence, mustard is not a good choice for use along the front where changes in the combat situation could require friendly forces to traverse or occupy terrain that had been contaminated with chemicals. All of our present mustard stockpile is either in bulk containers or in relatively short-range projectiles.

Question. What is the rationale for bringing additional 105mm chemical munitions into serviceable condition, when the Army is phasing out the 105mm howitzer?

Would all [deleted] rounds be intended for U.S. Marine Corps use, or could our allies use the 105mm chemical rounds also?

Answer. The Marine Corps and the Army airborne and light divisions will maintain some 105mm howitzers through 1988. To provide these forces with a chemical retaliatory capability a relatively small quantity of 105mm GB rounds need to be maintained. The numerical requirement is being evaluated.

Question. According to a 1979 GAO study, [deleted].

—Could you please describe the deployment plans for the existing chemical weapons?

—Have similar plans been developed for the binary munitions? If so, please describe them.

Answer. The [deleted]. These [deleted]. Even with these [deleted]. These [deleted].

Because of the restrictions of Public Law 91-121, current unitary chemical munitions cannot be moved without obtaining rigorous U.S. and State governmental approval. Once approval has been obtained, these lethal munitions would likely [deleted]. Moreover, these lethal weapons must be handled and controlled under a special surety program, similar to that for nuclear weapons. Consequently, there are extensive and costly safety requirements associated with these munitions such as specially trained security guards, maintenance and handling personnel, and technical escort teams. Unique procedures and equipment for handling, transporting, and decontaminating these weapons are also mandated. Further, there are very stringent storage requirements to include special earth-covered, arch-type magazines, site control centers, extensive intrusion detection devices and so forth. In addition to these and other unique needs, a manpower intensive and costly Chemical Personnel Reliability Program is required.

Similar [deleted] however, the following discussion will be applicable to their development. Logistics requirements for binary rounds are greatly simplified in comparison. The aforementioned special requirements for unitary munitions are not necessary for binaries, and the components of these munitions could be shipped [deleted] for a frac-

tion of the cost of air movement. These munitions have no complicated surety requirements. When the [deleted]. Moreover, the additional [deleted]. Binary munitions can also be stored with other compatible conventional explosives, such as small arms ammunition, thus lowering storage costs and providing for many more possible storage locations.

The unique safety record achieved with unitary chemical munitions is attributable to the exacting and stringent requirements which must be followed. When the logistical problems associated with the two types of munitions are weighed, however, safety, security, environmental and personnel factors, and overall costs clearly favor the binary munition.

CHEMICAL WARFARE

Question. Am I correct in my understanding that to date, the United States has not held any consultations with our Allies on the U.S. chemical warfare program?

Answer. Our allies have been kept informed of our intent to modernize our chemical retaliatory capabilities; however, we have not held formal consultations or sought their approval. Should forward deployment of binary chemical munitions on foreign soil be necessary, there will be full consultations with the governments involved prior to making any decision. There has been continual and extensive discussion and cooperation between this country and our NATO allies on the protective aspects of chemical warfare, and there is unanimity on the need for protective measures and training. [Deleted.]

Question. What is the status of bilateral US-UK chemical warfare discussions?

Answer. In July 1980, the U.S. and U.K. held bilateral CW technical talks in Washington. Follow-on talks scheduled for February 1981 were cancelled and no subsequent formal bilateral CW discussions have been held—although an informal discussion between the Ministry of Defense's Chief Scientific Advisor and the Chairman of the DoD CW Steering Group took place in March 1981 when the British presented some of their findings concerning the operational implications of CW use in European battlefield context. No subsequent CW discussions have been held with the British.

Question. Have the British agreed to coproduction?

Answer. No; but they have not been asked to agree to coproduction of chemical munitions.

Question. Have the British agreed to forward positioning of U.S. chemical weapons?

Answer. No; but the United States has not approached the British Government on this issue.

Question. Have coproduction or forward deployment discussions been held with any of our allies?

Answer. No. However, the U.S. has kept the Allies fully informed of U.S. plans concerning CW modernization. To date, no allied government has responded critically.

DESIRE FOR ARMS CONTROL

Question. In a February 12, 1981, memo to the Secretary of Defense, Dr. Jim Wade stated that: "Europe may view chemical warfare binary facilitization as indicative that the United States is not interested in seriously pursuing either arms control or better relations with the East."

Has Dr. Wade's early recognition of this problem of perceptions translated into any concrete activities illustrative of the Reagan administration's "commitment" to chemical warfare arms control?

Answer. Since February 12, 1981, the United States has initiated several activities and proposals which illustrate the administration's desire for complete and verifiable agreements leading to arms reduction. In the area of chemical warfare arms control, the U.S. participated actively in the Working Group on CW sponsored by the Committee on Disarmament in Geneva at both sessions, February 3 to April 4, 1981, and June 11 to August 21, 1981. In addition, the United States agreed to a renewed and expanded mandate for this Working Group in early February 1982 and participated in the session from February 2 to April 21, 1982. These sessions are scheduled to resume on July 20, 1982.

As noted in the certification to Congress provided by the President on February 8, 1982, the United States is committed to the objective of banning chemical weapons. The President further stated in Eureka, Ill., "In the 40-nation Committee on Disarmament, the United States seeks a total ban on all chemical weapons" on May 9, 1982. Lastly, in the "Report to Congress" forwarded to the Congress by the Secretary of Defense in March 1982, the first policy objective is stated as "the administration's ultimate goal in the area of chemical warfare (CW) is a complete and verifiable ban on the development, production, and stockpiling of chemical weapons."

Dr. Wade's statement, of which the above is a paraphrase, not a quote, was not the direct cause of such activities. However, it did mirror the administration's concern that its recognition of the need for negotiations through strength not be confused with a lack of desire to negotiate.

WAR-FIGHTING GOALS

Question. Given the U.S. goal of deterring chemical warfare and the DoD assertion that the Soviets are much better prepared to fight a chemical war than the United States, what the U.S. war-fighting goals in a chemical warfare situation?

Answer. Should deterrence fail, the primary war-fighting goal in a chemical warfare situation would continue to be to end the conflict as rapidly as possible on terms favorable to the United States and its allies. The specific goal relating to chemical warfare would be to insure that the initiator receive no significant military advantages through his use of chemical weapons: First, by surviving his attacks and maintaining military operations in the chemical warfare environment; and second, by insuring his forces sustained degradation in combat effectiveness at least equal to our own through having to protect against our retaliatory strike throughout his zone of operations.

CHEMICAL WARFARE

Question. What command and control mechanisms are there to insure against unauthorized/inadvertent use of chemical warfare?

Are these plans consistent with NATO's operations plans?

Answer. U.S. policy renounces the first use of lethal and incapacitating chemical weapons. The command and control procedures promulgated by the JCS to the commanders of unified and specified commanders are the following:

—Only the President may authorize employment of lethal chemical agents or munitions; [deleted].

Assisting in the implementation of these command and control procedures, emergency action procedures contain stringent authentication controls to protect against unauthorized or inadvertent use of chemical munitions.

These procedures are consistent with NATO's operation plans. [Deleted.]

DETERRENCE REQUIREMENTS

Question. Isn't the size of the stockpile largely irrelevant if the United States lacks a clear chemical warfare doctrine, if operational concepts are not known by the men in the field, and if United States and NATO forces continue at the same grossly inadequate level of training in offensive and defensive chemical warfare?

Answer. The retaliatory capability, as well as the defensive capability, required to deter chemical warfare does include doctrine and training. First priority in recent years has been improving our capability in these areas (the majority of our program funds will continue to be for defensive capability), and significant improvements have been made. For example, the recent 1981 Reforger Exercise conducted in West Germany with both United States and NATO forces involved extensive chemical warfare training, both defensive and offensive. The exercise was a successful one in pointing out that emphasis on chemical defense has improved capability to operate in a chemical environment, that further improvements in doctrine and training are needed, that degradation in effectiveness does occur in an environment in which chemical defense must be practiced, and that a significant military advantage could be achieved if no retaliation occurs. Thus, improvements are needed in all the areas, including the retaliatory stockpile, and it is important to improve all aspects of chemical warfare deterrence, including the stockpile. Further, it is as important to improve the quality of the stockpile as it is to have a stockpile whose size is credible. Indeed, we plan to decrease the size of

the stockpile, in chemical agent tons, while improving its military utility and placing the majority of our effort upon chemical defense.

DETERRENT VALUE

Question. Isn't the deterrent value of the binaries a "paper tiger" without major changes in doctrinal and operational concepts and chemical warfare training?

Why procure weapons now whose deterrent value is illusory? Why not focus on the doctrinal/operational and defensive inadequacies (which are overwhelming) and decide on procurement at a later date?

Answer. The deterrent value of binaries is not a "paper tiger." Although improvements in doctrine and training are desired and are being obtained, the doctrinal and operational concepts in existence provide a formidable capability with adequate defensive equipment and retaliatory munitions in the hands of trained personnel.

The deterrent value of binary chemical munitions is not illusory. However, we would be fooling ourselves if we believed that focusing on any one group of needs is prudent, rather than working on the entire requirement of obtaining a credible chemical warfare deterrence consisting of both a defensive and retaliatory capability.

Question. How have the Armed Services established their needs for chemical munitions?

How have the needs and uses for chemical munitions been coordinated with U.S. war-fighting goals in a conventional and nuclear conflict?

How does incorporating possible civilian casualties as a result of offensive chemical warfare use alter the requirements for a chemical warfare munitions stockpile?

Answer. The current JCS estimate of a prudent worldwide binary stockpile to sustain combat [deleted]. The JCS tasked the Theater Commanders in Chief (CINCs) to provide their chemical requirements based on their analysis of potential targets, weapons effects, and their capabilities to deliver chemical munitions. [Deleted].

Question. What is your estimate of the percentage of total artillery rounds fired that would need to be chemical rounds, if the objective is to force Warsaw Pact units into a protective posture? I have seen an estimate of 5 percent or less, what is your approximate estimate?

Answer. Military judgment dictates that [deleted] of the total artillery rounds fired would need to be chemical rounds vice the 5 percent estimate, achieving the objective of forcing Warsaw Pact units into a protective posture; thereby, over time degrading their mobility and combat effectiveness. [Deleted].

Question. What is the rationale for bringing additional mustard rounds into serviceable conditions? Is mustard still a useful agent?

Answer. The upgrade of mustard artillery rounds has been deferred. Mustard as an agent could be useful for denying terrain or forcing long-term restrictive protective and decontamination efforts. However, due to mustard's persistence it is not well suited for employment in areas where friendly forces might need to operate. Rather, it might be a good agent for contaminating rear area targets such as airfields, logistics nodes, and command and control centers. Artillery cannot reach these deeper targets and all of our weaponized mustard is in artillery rounds.

Question. Of what relevance is the statement that mustard freezes at 57 degrees? Is it not true that the mustard is just as effective, even if it is frozen?

Answer. No; it would not be as effective because freezing of the mustard agent in the projectile affects several critical factors. First of all, the agent would solidify in such a way as to make the projectile unbalanced. This condition would have a severe effect of the projectile's ballistic characteristics and, consequently, make them totally unsafe to fire. Agent solidification also interferes with the proper dispersal of the agent on the target area and greatly reduces its effectiveness. In summary, the old mustard munitions in our current stockpile offer no real value as a CW deterrent and should be demilitarized as soon as possible.

Question. Is there a single report which demonstrates that the agent in 155mm and 8-inch artillery projectiles is deteriorating at a measurable rate?

Answer. There is no single report which provides this information. The deterioration of the chemical agents has been determined by an Army program called the Surveillance Program—Lethal Chemical Agent Ammunition (SUPLECAM). This program compares the present purity and lethality of bulk and uploaded chemical

agents with the known purity of the agent at the time it was produced and filled in munitions or ton containers. Of 558 agent lots to be tested, 493 have been completed. Analysis of remaining lots of agent will be completed in fiscal year 1982 and a second phase of the program will be initiated.

Results of the first phase have shown agent deterioration and that the stabilizers added to the agent are being consumed. The second phase of the program will also include metallurgical analysis to determine what effects the agent breakdown acids are having on munition parts. Laboratory analysis and previous experience has shown that once the stabilizer is consumed, agent deterioration and the formation of highly corrosive breakdown products proceeds at a very rapid rate.

Question. Of the hundreds of thousands of nerve gas 8-inch and 155mm artillery rounds, is it not true that fewer than 50, only a tiny fraction of a percent, are classified as leakers?

Answer. It is true that only a small percentage of 8-inch and 155mm nerve agent projectiles have been classified as leakers. However, "leakers" are not the real problem with these munitions. We have positive evidence from our chemical munitions surveillance program that the nerve agent fill in these projectiles is deteriorating. Further, we also know that the stabilizing material added to the agent is being used up. Once the stabilizers are depleted, the deterioration proceeds very rapidly. The breakdown products of nerve agents are highly corrosive and effect the metal parts of the projectiles. Therefore, the serviceability of any of these munitions is questionable because the process of firing the projectiles places tremendous stresses upon them. The fact that an increased number of leakers have been detected is indicative that we are fast approaching the time when none of the munitions will be usable and should be demilitarized as soon as possible.

FUTURE RETALIATORY STOCKPILE

Question. Would all our chemical warfare resources eventually be composed solely of binary munitions or a combination of "new" binary and "old" unitary munitions?

Answer. All our "old" unitary munitions eventually will be demilitarized, leaving only "new" binary munitions. However, the usable portion of the unitary stockpile will be maintained until binary munitions are available to fill their role or until they deteriorate to the point of being unusable, whichever comes first.

BINARY STOCKPILE SIZE

Question. If solely binary, will total quantity be equal to present stockpile levels or more?

Answer. The total quantity of agent which could be produced by the binary stockpile (recognizing no agent exists before employing the binary munitions) would be less than present stockpile levels even if the binary precursors were totally converted to nerve agent.

DEMILITARIZATION TIMING

Question. Will unitary agents be withdrawn and destroyed on a one-for-one basis as binaries are produced or will the present stockpile be maintained (and refurbishment continued) until full production of binaries is completed and only then demilitarized?

Answer. The ultimate objective is to demilitarize the entire unitary agent and weapons stockpile; however, the primary limiting factor is the development of safe, cost-effective methods to demilitarize the unitary stockpile and the construction of demilitarization facilities. As discussed in the testimony, approximately 90 percent of the unitary stockpile is either unusable now or will become unusable by the late 1980's. There is a need to demilitarize this material; however, the current technology and procedures are extremely expensive. Since the material is safe in storage, it appears prudent to further investigate the demilitarization problem in hopes of finding less costly alternatives. That portion of the unitary stockpile which is potentially militarily useful (approximately 10 percent) will be maintained as part of a mixed retaliatory stockpile until they are replaced with binary systems.

RETALIATORY STOCKPILE

Question. If future stockpiles are a combination of binary and unitary, does this not weaken your case against unitary munitions?

Will this not complicate storage, transport, and control requirements?

Will it not also greatly increase the total chemical warfare stockpile?

Answer. Future stockpiles will be a combination of binary and unitary munitions only during the transition from unitary to binary stockpile, during which time a credible deterrent must be maintained. The binary munitions will improve logistics requirements even during the transition phase. The total agent stockpile will be decreased as demilitarization occurs.

BINARY TECHNOLOGY EXPORT CONTROL

Question. Will binary production necessitate U.S.G. imposition of export controls on petrochemical feedstocks and equipment related to binary chemical weapons production?

Are such export controls being considered by the administration?

Would we also possibly want our NATO allies to impose export controls on binary chemical weapons technology, particularly to the Warsaw Pact countries?

Answer. Materials and equipment related to toxic substances in general are subject to export controls. Binary production will not change existing requirements, since the binary technology is old and already in the open literature and since related feedstocks and equipment are the same as unitary agents. NATO allies already participate in existing agreed export controls.

BINARY PROGRAM

Question. I understand the two precursor chemicals in the binary artillery munitions to not mix instantaneously to form a lethal agent. What length of time is needed to reach 100-percent lethality in the 155mm projectile? What is the range and flight time of the 155mm projectile? How lethal will the agent be upon detonation? Is that more or less than existing unitary munitions, even taking deterioration into account?

Answer. The chemical reaction between DF and OPA for maximum agent yield is completed within 3 to 8 seconds. The lethal nerve agent GB is formed in-flight and is disseminated upon detonation of the munition. The binary-formed nerve agent is at least as lethal as the neat GB agent filled in the current artillery projectiles. In addition, testing has shown that on a round-for-round basis, the mean performance or on-target effectiveness of the M687 GB-2 binary munition exceeds the mean performance of the current M121A1 GB unitary munition.

In regard to flight data, the minimum range (high angle fire, 72 degrees) is approximately 4,000 meters. This equates to about 48 seconds of flight time. The current maximum range is 17,300 meters, which equates to about 68 seconds of flight time. Plans are underway, however, to extend the maximum range to 22,500 meters.

Question. The environmental impact statement indicates that QL (one of the two precursors used in the Bigeye bomb) is very hazardous to handle. What is the toxic nature of the precursor chemicals used in all of the binary munitions?

Answer. Binary chemical precursors used in the Bigeye VX-2 bomb and the 155mm GB-2 artillery projectile fall well within the toxicity levels of normal commercially available industrial-type chemicals. In fact, QL is more than 700 times less toxic than parathion, 16 times less toxic than chlorine, 9 times less toxic than formaldehyde, 3 times less toxic than ethanol (drinking alcohol), less toxic than caffeine, and approximately the same as ammonia. Sulfur, the second component for the Bigeye bomb, is commonplace and used extensively throughout industry and the commercial market.

For the 155mm GB-2 projectile, DF (Difluor) is more than 180 times less toxic than parathion, 4 times less toxic than chlorine, 2 times less toxic than formaldehyde, less toxic than tear gas, and approximately the same as ethanol. In addition, ethanol (ethyl alcohol) is 15 times more toxic when inhaled than the isopropyl alcohol and isopropylamine mixture component for the 155mm binary rounds.

Question. What procedures are required for handling the precursor chemicals used in the Bigeye bomb? How would binary munitions components be stored? In close proximity, same base, different bases?

Answer. Aside from physical security, the binary precursor components will be handled in ways similar to industrial chemicals with similar toxicity levels.

The binary 155mm artillery projectiles and Bigeye bombs, each with one chemical precursor uploaded (DF and QL respectively), will be stored at existing munition storage sites for Sensitive Conventional Ammunition control. As an additional feature, individual canisters/containers of DF or QL will also be treated as sensitive items even though they are classified as industrial chemicals and, in fact, are much less hazardous than many readily available chemicals such as pesticides, aroclor, et cetera, that are handled daily within industry. All storage would be under strict access and inventory control, and a special monitoring/surveillance program will be used to verify the safe condition and integrity of the munitions and precursor containers. As currently planned, containers of the second chemical precursors (OPA and sulfur) for the binary munitions will be stored at separate facilities/installations from the munitions and DF and QL containers, and treated as industrial-type chemicals.

Transportation of the munitions and chemical precursors will be in accordance with Department of Transportation and any other Federal, State, and local regulations governing the movement of category II ammunition and/or industrial-type chemicals. None of the binary components are classified as poison A or B material.

In all instances, handling, transport, and storage of binary precursor chemicals will be done in a manner to insure adequate safety and occupational health. Likewise, environmental controls will be used to eliminate any hazards to plant workers and the general public.

SECOND CHEMICAL USED IN BIGEYE

Question. As I understand it, the second chemical used in the Bigeye bomb, sulfur, is added to the bomb before the pilot takes off. Once the pilot is a certain distance from the target, he must press a button which starts the mixing process in the munitions.

Does this mean that the pilot is carrying live rounds of nerve gas—actually unitary weapons—and not binary munitions?

Answer. What the pilot has once the weapon is loaded on his aircraft is a weapon that has two nonlethal chemicals separately contained within the casing. There is no live agent created until the pilot activates the mixing process prior to release over his target. If the bomb is not released at the proper time window after mixing begins, the nerve agent confined in the bomb rapidly deteriorates as mixing action continues. Therefore, the aircraft is carrying nerve agent for only a few minutes at the longest. This is a great improvement in safety over unitary chemical bombs and spray tanks which contain toxic agents at all times.

Question. In a live fire situation, won't combat effectiveness be compromised when artillery crews must spend time assembling binary shells? If this effectiveness is diminished, won't the effectiveness and "safety" of all forward units be compromised?

Answer. The time required to assemble binary shells is about the same as that now spent to fuze the shell, an acceptable delay for the safety and flexibility provided. Proposed doctrine for use of binary munitions call for the shells to be normally assembled at the forward ammunition supply point to make this operation even more efficient than fuze assembly and setting.

Question. Given the U.S. policy of no first use and the defensive capability of Soviet forces, to what extent can the United States/NATO expect to inflict military casualties on the enemy through the use of chemical warfare?

How does the effectiveness of chemical warfare in this regard compare with that of other weapons?

Answer. The United States can expect to inflict those military casualties predicted for well-trained, well-equipped troops dependent upon the degree of surprise achieved and level of protection (and, hence, degradation in effectiveness) in effect at a target. That is the same as what the U.S.S.R. can expect if we properly train and equip our forces. The number of direct casualties among such forces should be less than those achieved with the same number of improved conventional munitions. However, the degradation in combat effectiveness before the attack (e.g., due to having to carry or wear protective clothing) during, and after the attack due to the combination of individual, collective, and unit defensive equipment and procedures is estimated to more than equal the loss in effectiveness due to other weapons. In fact, the use of chemical weapons in con-

junction with other weapons is estimated to cause many more casualties and loss of combat effectiveness than if either system were used alone.

The true value of a chemical retaliatory stockpile is intended to be its deterrent capability. If there is a credible defensive and retaliatory capability, there will not be a significant military advantage for an initiator. Therefore, it is reasonable to believe that initial use would be deterred.

NONPRODUCTION BINARY PROGRAM FUNDS

Question. What additional funds are being requested for: Other production equipment; construction of the Bigeye bomb fill facility; Bigeye bomb metal parts equipment; establishment of a commercial source for one of the Bigeye chemicals; and other additional binary munitions research and development efforts?

Answer. The requested fiscal year 1983 funds associated with the binary program in addition to munition procurement are:

Other production equipment	
Construction of the Bigeye bomb fill facility	\$18,000,000
Bigeye bomb metal parts equipment	14,000,000
Establishment of a commercial source for one of the Bigeye chemicals	10,000,000
Other binary munitions research and development efforts	32,000,000
Total	74,000,000

Question. When will most of the demilitarization cost occur? What programs is the Army initiating to discover more cost-effective demilitarization technologies?

Answer. The entire unitary chemical stockpile must be demilitarized eventually. The estimated cost is \$2 to \$4 billion, of which about \$1 billion is planned through fiscal year 1987. The actual costs and schedule will depend upon research and development efforts initiated in fiscal year 1982 with \$10 million. The sum of \$13 million has been requested for fiscal year 1983 to continue these efforts.

Question. What is the operations and maintenance cost in fiscal year 1983 for maintaining Johnston Island?

Answer. Johnston Island is a Defense Nuclear Agency facility which is managed by the U.S. Air Force. The 267th Chemical Company, a WESTCOM unit, is a tenant activity on the island. This unit is responsible for the maintenance and storage of the chemical munitions stored there. The operations and maintenance cost for the chemical munitions storage site at Johnston Island for fiscal year is \$937K. This cost does not include the military pay for the personnel of the 267th Chemical Company.

CHEMICAL WARFARE RESEARCH AND DEVELOPMENT

Question. The Army has requested \$14.8 million for exploratory development on new chemical munitions concepts including the MLRS and cruise missile. This is primarily a technology base program. (Title: Chemical Munitions/Chemical Combat Support, 62622A). Why are we expanding exploratory research on new chemical munitions concepts at a time when the 155mm binary production issue has not been settled?

Answer. The \$14.8 million figure attributed to exploratory development on new chemical munitions concepts is an incorrect dollar figure. Program Element 6.26.22A, Chemical and Smoke Munitions, supports technology base efforts in smoke and obscurants, incapacitating agents, and riot control agents, in addition to new chemical munitions concepts. Of the \$14.8 million requested in Program Element 6.26.22A, approximately \$6.5 million is programmed for the effort in new chemical munitions concepts.

There is no issue as far as the Army is concerned with respect to the 155mm binary artillery munitions requirement. We have stated a critical need for this munition since the early 1970's and the President's budget supports the need. To effectively deny the enemy a significant advantage from chemical warfare use and thus deter him, we need to have the capability to attack his troops from the forward edge of the battle area (FEBA) through his rear areas. To accomplish these missions, a family of weapons and agents are required. Artillery will provide a responsive close-in, all-weather strike capability independent of the availability of tactical air. Air-delivered munitions will

provide the capability to attack deep targets with heavy agent concentrations to delay and disrupt second echelon forces, lines of communication, command and control, logistics complexes, airfields, and other critical capabilities.

Current efforts in chemical munitions concepts are developing the technology base for binary long-range projectiles, rocket and missile warheads, and standoff air-delivered systems which would reduce the need to penetrate terminal air defense and provide a mid- through deep-range capability, independent of the availability of tactical air. These efforts include applied research in potential binary chemical munitions for air and ground delivery using standard and advanced weapons systems and exploratory development of binary lethal chemical agents with varying degrees of volatility.

Question. What other weapons systems are being investigated as potential new delivery platforms for chemical munitions?

Answer. The retaliatory R&D program is directed toward determining the feasibility and utility of and, if required, developing other chemical weapons besides the 155mm binary projectile and USAF Bigeye bomb. Some items being considered/developed by the Army are chemical munitions for the corps support weapon system, the multiple-launch rocket system, and the 8-inch howitzer. The Air Force is initiating an effort to determine the need and evaluate concepts for follow-on air-delivered weapons.

INTERMEDIATE VOLATILITY AGENT

Question. Why was the decision made to accelerate the advanced development of the 8-inch IVA binary agent? How much funding is dedicated in fiscal year 1982 to its accelerated development?

Answer. Initially, development of an 8-inch projectile was concentrated on a binary VX-2 persistent agent fill. This effort resulted in the development of substantial 8-inch binary munition technologies. Because of the range of the 8-inch weapon system, a decision was made, during a special in-process review (IPR) of this program, to complete development of the 8-inch binary projectile with an IVA fill. The IVA is effective through inhalation as well as skin penetration versus agent VX which is effective primarily by skin penetration and presents a long-term contamination hazard. IVA is the preferred agent of fill for the 8-inch system which is designed to be employed near the forward edge of the battle area. Acceleration was possible due to the technology that was gained in the initial 8-inch persistent agent effort. In fiscal year 1982, \$1,874,000 is dedicated to conducting advanced development on the 8-inch IVA projectile.

Question. What is the current milestone for the completion of advanced development of the IVA? What was the milestone shown in the last year's fiscal year 1982 budget submission?

Answer. The current milestone for the completion of advanced development on the 8-inch IVA projectile is fourth quarter fiscal year 1983. The milestone for the 8-inch IVA projectile shown in the fiscal year 1982 budget submission was fourth quarter fiscal year 1987. The difference in the fiscal year 1982 and fiscal year 1983 milestones for completion of advanced development for the 8-inch binary IVA projectile is due to a decision to terminate the development of the 8-inch VX-2 munition and place all emphasis on accelerating the development schedule of the 8-inch IVA munition utilizing technology gained in the 8-inch binary VX-2 development effort.

Question. What would be the time frame in which we could expect you to make a decision in whether to initiate engineering development of the IVA? How would this be affected if the money dedicated to IVA acceleration in fiscal year 1983 were denied?

Answer. A validation in-process review (VAL IPR) is scheduled for September 1983 at which time a decision will be made whether or not to advance the 8-inch IVA projectile into engineering development. If fiscal year 1983 funds are deleted, DTI and OTI testing cannot be accomplished and thus, the entire advanced development effort would have to be terminated. This will result in at least a 1-year delay in initiation of engineering development and ultimately type classification.

BIGEYE

Question. The Bigeye binary spray bomb is another binary chemical munition to enter production in fiscal year 1983. The Navy's fiscal year 1983 RDT&E request for Bigeye is \$8 million. This funding supports an initial Navy operational test and evaluation period for Bigeye. When will a full production decision be made?

Answer. Bigeye production will take place in three distinct phases: (1) Low rate initial production beginning in the second quarter fiscal year 1983 [deleted] units; (2) Navy first production beginning in the second quarter fiscal year 1984; and (3) Army full-rate production as single manager beginning in the first quarter fiscal year 1985.

The full-rate production decision (Milestone III) is scheduled to be made in April/May 1984.

Question. What are the operational concepts for the use of chemical warfare by the United States? To what extent have these operational plans been based on Soviet offensive doctrine and probable defense tactics? How are these concepts integrated with the overall U.S. military strategy?

Answer. The concept of operations for the conduct of chemical warfare by the United States is [deleted].

Doctrine is the fundamental ingredient from which requirements are developed and against which performance is measured. Doctrine helps define how our forces are expected to fight (concepts of operations) and our equipment is to operate in a chemical environment. Peacetime training and use of protective and defensive equipment provide feedback that is vital to the refinement of doctrine. A joint chemical warfare operational concept is being revised to further assist U.S. forces in fighting on the modern-day battlefield. Concepts are integrated into U.S. military strategy by the theater commanders. The Services support the theater commanders by organizing, training, and equipping combat-ready forces.

Further, in integrating the concept into military strategy, the cornerstone of any chemical warfare concept of operations is the U.S. policy which renounces the first use of lethal chemical weapons in war. The forward strategy associated with the U.S. commitment to its allies requires that U.S. forces be prepared to conduct prompt and sustained combat operations in a chemical environment, on land, at sea, and in the air, to support the air-land battle, sea control, and power projection.

Question. Who can authorize deployment of chemical weapons from storage depots to forward units?

Answer. [Deleted.]

Question. Does the soldier in the field know and understand what to do in case of a chemical warfare attack?

Answer. Personnel of the U.S. forces are trained in chemical attack response procedures, first aid, use of protective equipment, and mission accomplishment under chemical conditions. Actual proficiency (as in most other areas) varies from individual to individual and unit to unit; however, the state of training has been improving for a number of years and continues to do so.

Question. What modifications are needed in U.S. chemical warfare doctrinal and operational concepts? How will these concepts be integrated with overall U.S. military strategy? What are the implications of the binary program for rationalization, standardization, and interoperability with NATO?

Answer. All Services are now involved in improving and developing modern-day chemical warfare operational concepts. The modifications to chemical doctrine and concepts are driven by the fact that U.S. forces may be committed to war in any of a variety of places and situations, and fighting against highly mobile, well-equipped forces who employ sophisticated combat systems of increased lethality to attack targets at all depths. [Deleted].

DEFENSIVE AND DOCTRINAL INADEQUACIES

Question. Given that the United States already possesses a stockpile of offensive lethal chemical weapons, why can't the defensive inadequacies and doctrinal/operational issues be addressed and satisfactorily resolved before consideration of procurement of a new offensive weapon?

Given past history with regard to defensive and doctrinal/operational issues, do you really expect that these inadequacies will be addressed if binary weapons are produced now?

Answer. As stated in the testimony, an improved defensive posture alone is insufficient to deter the use of chemical weapons. The degradation in performance associated with the use of protective equipment and procedures is so severe that it provides an incentive for chemical weapons use. If a potential user of chemical weapons knows that he will have to adopt the same protective measures as his intended victim (due to retaliation), it is likely that he will perceive little advantage from chemical use and will be deterred. Similarly, a purely offensive capability is not an adequate deterrent (particularly for a nation which has a no-first-use policy) because one must retain a viable force for retaliation and subsequent combat.

Although much remains to be done, there has been considerable improvement in U.S. chemical protective capabilities over the past several years, while our retaliatory capabilities have remained static or have degraded. What is proposed is a more balanced approach that will make major improvements in protective capabilities while initiating improvements in our retaliatory capacity. Through fiscal year 1987, approximately two-thirds of the funds will be for protection and about one-sixth will be for modernization. The remaining one-sixth will be for demilitarization of existing stockpile items.

We view both the protective and retaliatory aspects of the program as essential for deterrence and expect that they will be carried out. This includes the development of applicable doctrine, operational concepts, and procedures.

Question. To what extent has training been given in both offensive and defensive chemical warfare? Please describe the specific nature of U.S. chemical warfare training.

Answer. The objective is to train individuals to react to a chemical attack automatically and exactly; to accustom individuals and units to physiological and psychological stress of CW so they can perform their combat missions over extended periods of time in full protective equipment; and to train headquarters and staffs in command, control, and communications in a CW environment. The Services will improve their chemical defense training status by providing more equipment, programing training for all critical forces and activities, conducting routine chemical training exercises, and establishing standards for task performance for individuals and units in contaminated environments. Joint exercises include chemical operations in their scenarios. The increased emphasis on CW was reflected in the September 1981 Reforger Exercise in which Air Force, Army, and NATO allied force conducted extensive chemical training. Chemical training facilities will be improved [deleted].

Specific chemical warfare training situations are integrated early into phases of individual training and small unit exercises to portray realistic threat doctrine and capabilities. Units with inherent reconnaissance missions are trained in chemical detection and identification procedures. Improved and new methods of simulating chemical attacks are used during small and higher level training exercises to employ and evaluate the chemical warning, reporting, and defensive systems. Chemical contamination avoidance, medical, and logistical problems are evaluated and responded to realistically at command and staff levels.

EMPLOYMENT OF CHEMICAL WEAPONS

Question. If, [deleted] the Soviet strategy is to use chemical warfare in a surprise attack against NATO forces in Europe, how quickly could our stockpiles be counteremployed for retaliation? Existing unitary munitions stockpiled in Europe? Binary munitions, especially if stored in CONUS? Of what military use would chemical munitions be? Would not a Soviet attack focus on chemical warfare depots and logistic supply lines?

Answer. The execution of retaliatory chemical strikes is contingent on two factors: (1) The distribution of chemical munitions to units; and (2) obtaining retaliatory authority from the President. Assuming that no chemical weapons were dispersed to units and that no preparations for CONUS resupply were made prior to a Soviet first strike, the first retaliation could occur within approximately [deleted] with in-place unitary stocks and within [deleted] with CONUS-based binary stocks. The most rapidly employable CONUS-based stocks would be [deleted].

The military utility of chemical weapons (as viewed by the United States) is (combined with protective measures) to deter the use of chemical weapons against United States or allied forces. Chemical weapons contribute to this deterrence by enabling us to impose the same restrictive protective measures on an enemy that he forces on us with his chemical first strike. We believe this eliminates the possibility of gaining a significant military advantage from chemical use and will thus deter enemy first use.

It is likely that, in addition to front line units, rear area targets such as supply nodes, command and control centers, and airfields will be chemical targets, and efforts are underway to improve the chemical protective posture of these facilities.

BINARY WEAPON DEPLOYMENT

Question. If our NATO allies won't permit forward deployment on their soil, how will the binary munitions be deployed? If deployment is aboard U.S. naval vessels, how many binary munitions will be in European waters at any given time? If deployment is aboard U.S. naval vessels, what munitions, supplies, spare parts, et cetera, will be removed from these vessels to make room for the binary munitions? How will this change affect naval combat readiness or the readiness of our amphibious forces?

Answer. No decisions have been made about deployment of binary chemical weapons overseas or on Navy ships. Deployment with carrier battle groups is an option which is being studied by the Navy and their study is addressing the issues raised in the question. A point that should be stressed is that the munitions loadout of a fleet is at the option of the commander, who, at least to some extent, tailors the load based on the mission he must perform. Additionally, since U.S. policy is to use chemical weapons only in retaliation, the commander will carefully consider the threat he faces before deciding whether to carry chemical munitions.

Question. Our NATO allies view nerve gas as a weapon of mass and indiscriminate destruction. Under current chemical warfare employment plans, how many civilian casualties can be expected from chemical warfare use in a conflict in the European theater? What plans, if any, have been made to protect dependents of American forces stationed in Europe?

Answer. Under current plans, the major problem affecting military planners is that it is impossible to predict what the civilians will do once fighting begins. In an effort to determine how many civilian casualties can be expected from chemical warfare use in a conflict in the European theater, a recent study effort was asked to furnish insights. In this study, three different civilian population levels were considered as constraints to the targeting of chemical weapons. These targeting constraints were towns and cities whose populations were greater than 2,000, 10,000, and 20,000 people. This meant that a particular chemical fire mission would be canceled if civilians in these locations could be exposed to lethal levels of chemical agent. The distribution of the civilian population into various physical locations, which serve as protection against chemical effects, is presented below. (Values in parentheses are for rear areas; other values refer to forward areas):

- 10(15) percent in the open,
- 60(50) percent in single-story buildings,
- 15(30) percent in multistory buildings,
- 15(5) percent in basements.

Since the distribution of civilian population over time can change quite significantly among the locations shown above, as well as among the towns and cities that are being considered as targeting constraints, a period of only 5 combat days is considered.

The estimation of civilian casualties resulting from the use of chemical weapons is made as follows: It is assumed for the analysis that all people who normally live in towns or cities that have populations less than the targeting constraint level will be considered as part of a rural density for that area of the battlefield. As the allowable chemical weapons are fired, civilians composing the rural density are the ones vulnerable to becoming a casualty.

The results presented below in the table depict the impact that the various targeting constraints have on the level of casualties inflicted. Data are presented for cases where a day is considered to be 24 hours of combat or 14 hours of combat.

Question. [Deleted.]

Civilian population constraint	Civilian casualties ¹ inflicted by—		Total civilian casualties ¹ for 5 days of combat	
	NATO	Pact	24 hours/day	14 hours/day
2,000	2,050	10,830	12,880	7,510
10,000	4,610	31,720	36,320	21,210
20,000	8,280	56,650	64,930	37,880

¹ These are NATO civilians only; Pact and NATO forces are assumed to follow the same targeting constraint.

[Deleted.] The U.S. theater commander has developed plans for the evacuation of U.S. dependents in case of a crisis situation in Europe.

Question. [Deleted.]

Answer. [Deleted.]

Question. In view of the present legislation that prevents field testing of binary munitions in the United States, has consideration been given to the possibility of collaborative testing with, say, Canada or France?

Answer. The United States has not asked other nations to allow testing of binary weapons on their soil and there are no plans to make any such requests.

CHEMICAL WEAPONS BUDGET

Question. Have we antidotes to protect our own forces against the projected new IVA?

Answer. The final selection of an IVA (semipersistent) agent is still being assessed as part of our RDT&E program. Consideration of the availability of drug therapy and antidotes will be part of the IVA agent selection process. Research efforts are ongoing to define and develop new and improved therapy procedures and drug regimens which would protect and/or assist in the treatment of chemical agent casualties.

CONCLUSION OF HEARINGS

Chairman HATFIELD. That concludes the hearings. The committee will recess and reconvene at the call of the Chair.

[Whereupon, at 5:30 p.m. Thursday, May 6, the hearings were concluded and the subcommittee was recessed to reconvene at the call of the Chair.]

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